



## Appendix A. Phase I Summary Report

# MoveAZ Plan

*prepared for*

**Arizona Department of Transportation**

*prepared by*

**Cambridge Systematics, Inc.**

*with*

Lima & Associates  
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BJ Communications, Inc.



August 2002

*MoveAZ Plan*

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*August 2002*

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## **1.0 A Strategic Direction Process for MoveAZ**

# 1.0 A Strategic Direction Process for MoveAZ

The first phase of work on the Arizona Long-Range Transportation Plan (MoveAZ Plan) provides a strategic direction for state transportation goals and objectives. This was accomplished through review and evaluation of existing documents, previous planning processes, Arizona-specific plans and processes, and similar experiences from other states. From these sources, recurrent themes and issues were identified and used to guide the development of the mission statement and strategic directions for transportation investment in Arizona. The mission statement and broader strategic direction will be the subject of review and comment by stakeholders and the general public in Phase II of the MoveAZ Plan.

This report presents a review of the process used to create the strategic direction. It is intended as a supplement to the MoveAZ Phase I brochure. This section provides additional information describing the creation of the mission statement. Section 2.0 provides a summary review of planning documents and reports that were used to understand the Arizona context. Section 3.0 reviews the key data used to support the plan. Several appendices present detailed information about the supporting material used for this document.

## ■ 1.1 Definition and Purpose of the Mission Statement

A mission statement is a brief description of a desired future condition or set of conditions that is dependent on the outcomes of transportation policies and decisions, usually among a broader set of policies. It is a description of where citizens will be in terms of overall quality of life if the goals and objectives of the mission statement are implemented through specific policies.

A mission statement is policy oriented. Its primary purpose is to frame the development of goals and objectives that, in turn, will drive the development of transportation investments that can be implemented to achieve the strategic direction for the MoveAZ Plan. Those logical linkages between policy and strategic direction need to be clearly evident. In the end, if the mission statement is not regularly used as a reference point in the policy arena, it has little value.



## ■ 1.2 Principles and Guidelines

The following principles and guidelines were used to craft the mission statement for Arizona.

***It needs to be realistic.*** The mission statement should not be an unattainable transportation nirvana, but rather a realistic target that is achievable through the implementation of a set of outcome-driven policies and strategies over a reasonable period of time, say, 15 to 25 years. Such a timeframe is important, because impacts of major transportation policies and investments on major quality-of-life issues, such as development and land use, typically take many years to unfold. Mission statements that are, or are widely perceived to be, hopelessly unrealistic are not useful for policy- or decision-making purposes and will generally be ignored.

***It needs to be integrated with clear goals and objectives.*** Mission statements need to be viewed as part of a coherent vision-goals-objectives package. Collectively, they describe the ultimate destination, provide the guidance to developing policies that move toward a realistic direction for transportation, and specify the means to help measure progress toward that destination. Mission statements tend to have little practical value as stand-alone documents.

***It needs to be fiscally responsible.*** Mission statements should openly acknowledge the fact that substantial resources will be required to achieve the direction for transportation. Consequently, a mission statement should also assume reasonable and realistic funding elements for a desirable future scenario. The revenue plan prepared for the Vision 21 Task Force was quite explicit and specific about this frequently ignored, but vitally important issue.

***It needs to be flexible.*** A mission statement should be part of the overall process that will result in the strategic decisions needed to move stakeholders and citizens toward the defined direction for transportation. As such, it should acknowledge, or at least imply, that the realization of the mission statement will require the selection of discrete policy options – and, of course, the rejection of others.

***It needs to be functional and practical.*** The preceding observations point toward a mission statement that is functional for policy-making purposes and one that will be used in practice. As such, it should raise eyebrows, questions, and possibly objections. A mission statement with which virtually no one could possibly disagree is also one that will have virtually no value in helping stakeholders and citizens achieve it.

## ■ 1.3 A Mission Statement for Arizona

*To support Arizona’s quality of life, the MoveAZ Plan will provide a safe, reliable, and efficient transportation system for people and goods that strengthens our economic vitality; assures access to services and recreational opportunities; preserves the beauty and health of our natural environment; and blends into our urban and rural landscapes.*

*To achieve these ends, the Move AZ Plan will:*

- *Be fiscally responsible;*
- *Provide citizens with transportation choices;*
- *Emphasize accountability;*
- *Be responsive to change;*
- *Harmonize with Arizona’s proud heritage and unique diversity;*
- *Encourage coordination of transportation and land use planning at the state, regional, and local level; and*
- *Address air, transit, rail, highway, bicycle, and pedestrian travel.*

## ■ 1.4 Goals and Objectives

The long-range goals reflect the spectrum of major goals or desired outcomes expressed by both the mission statement and numerous planning efforts from around the state.

These goals, in turn, suggest broad performance factors (e.g., “reliability” or “equity”) that can be described and evaluated with more detailed performance measures. Performance factors may help describe multiple goals, but suggest different, more specific objectives and strategies for action. For example, “mobility” as a performance factor might be linked to objectives in both the Access and Mobility and Stewardship goal areas, because there are objectives in each towards improving the mobility of Arizonans.

Table 1.1 presents the draft long-range goals and performance objectives for the MoveAZ Plan. The objectives are presented at a level of generality that applies broadly to the entire state. These are not intended to be the final objectives for the MoveAZ Plan, but rather an interim step towards developing a refined and final set of long-range objectives. Public review of these goals and objectives will refine and clarify them and ensure they are tracking the themes that are important to Arizonans.

**Table 1.1. MoveAZ Plan Strategic Direction – Draft Goals and Objectives**

Long-Range Goal	Arizona Performance Factors	Long-Range Performance Objectives
<b>Access and Mobility.</b> A reliable and accessible multimodal transportation system that provides for the efficient mobility of people and goods throughout the state.	Mobility	<ul style="list-style-type: none"> <li>• Maintain and enhance levels of circulation (e.g., reduced congestion) on highways, arterials, and major collectors.</li> <li>• Maintain and enhance the ability of goods to move through and around urban areas with minimal delay.</li> <li>• Encourage the development of transit options for economically disadvantaged populations.</li> </ul>
	Reliability	<ul style="list-style-type: none"> <li>• Improve the availability and quality of real-time information to increase the ease of use and attractiveness of both highways and public transportation.</li> <li>• Reduce delay caused by at-grade highway-railroad crossings.</li> <li>• Develop and implement an access management program to preserve the reliability of the state highway system.</li> </ul>
	Accessibility	<ul style="list-style-type: none"> <li>• Encourage the development of effective public transportation, ride share, and related options where appropriate and cost effective.</li> <li>• Support Title 6 ADA compliance for access by disadvantaged groups to all transportation services.</li> <li>• Integrate transit, bicycle, and pedestrian facilities into highway improvements where feasible.</li> <li>• Maintain and enhance connections to major commercial, residential, and tourist destinations by both highways and public transportation.</li> <li>• Maintain and expand border crossing facilities.</li> </ul>
	Connectivity	<ul style="list-style-type: none"> <li>• Maintain and enhance intermodal passenger connections between air and surface (highway and transit) transportation modes.</li> <li>• Maintain and enhance intermodal freight linkages for truck-rail and truck-air transfers.</li> <li>• Continue necessary expansion and connection of Arizona’s metropolitan highways and HOV lanes.</li> <li>• Ensure the connection of rural communities to the state highway network.</li> </ul>

**Table 1.1. MoveAZ Plan Strategic Direction – Draft Goals and Objectives  
(continued)**

Long-Range Goal	Arizona Performance Factors	Long-Range Performance Objectives
<b>Safety.</b> Provide safe transportation for people and goods.	Safety	<ul style="list-style-type: none"> <li>• Reduce the rate of crashes, fatalities, and injuries for motor vehicles, bicycles, and pedestrians.</li> <li>• Design new transportation facilities to minimize accidents.</li> <li>• Improve the safety of commercial vehicles, public transportation vehicles and facilities, and where modes intersect.</li> <li>• Upgrade at-grade railroad crossing protection.</li> <li>• Increase ADOT's support and use of incident management on the state highway system.</li> <li>• Coordinate with federal, regional, local, and tribal officials to provide redundancy of access for emergency response and evacuation situations (e.g., bridge crossings, multiple access routes to airports and other key transportation facilities, etc.)</li> <li>• Improve safety and security for rural area travelers (e.g., build an emergency call box systems).</li> </ul>
<b>Economic Vitality.</b> A multimodal transportation system that improves Arizona's economic competitiveness and provides access to economic opportunities for all Arizonans.	Economic competitiveness	<ul style="list-style-type: none"> <li>• Maintain and expand freight transportation and intermodal linkages.</li> <li>• Increase coordination of transportation planning with the economic development activities of state, regional, and local governments.</li> <li>• Equitably distribute transportation to all areas of the state.</li> </ul>
	Accessibility	<ul style="list-style-type: none"> <li>• Maintain and improve truck linkages between Arizona, other states, and Mexico.</li> <li>• Maintain and improve access to major tourist destinations.</li> <li>• Encourage the development of transit services that provide access to job centers.</li> </ul>
<b>Stewardship.</b> A balanced, cost-effective approach that combines preservation with necessary expansions and coordinates with local and regional transportation and land use planning.	Preservation	<ul style="list-style-type: none"> <li>• Preserve and maintain existing transportation infrastructure.</li> <li>• Develop and implement an access management program to preserve the functionality of the state highway system.</li> <li>• Coordinate planned transportation system expansions with future funding capabilities.</li> <li>• Increase efficient coordination of state transportation planning and programming processes with local and regional land use planning processes.</li> </ul>
	Mobility	<ul style="list-style-type: none"> <li>• Increase and/or protect capacity of the existing transportation system through increased use of traffic operation and management strategies, including Intelligent Transportation Systems (ITS) methods.</li> </ul>

**Table 1.1. MoveAZ Plan Strategic Direction – Draft Goals and Objectives  
(continued)**

Long-Range Goal	Arizona Performance Factors	Long-Range Performance Objectives
<b>Environmental Sensitivity.</b> A transportation system that enhances Arizona’s natural and cultural environment.	Resource conservation	<ul style="list-style-type: none"> <li>• Increase energy conservation and the use of recycled materials and cost-effective alternate energy sources.</li> <li>• Give preference to use of native or indigenous species in transportation-related landscaping projects.</li> <li>• Encourage the development of smart growth policies in coordination with state, regional, local, and tribal planning processes.</li> </ul>
	Environmental protection	<ul style="list-style-type: none"> <li>• Increase proactive coordination of transportation planning with federal, state, and regional environmental agencies.</li> <li>• Minimize the contribution of transportation investments to air, water, and noise pollution in all areas of the state.</li> <li>• Ensure that negative environmental impacts of transportation investments do not fall disproportionately on disadvantaged groups.</li> <li>• Minimize the impact of transportation investments on natural habitats, animal travel corridors, historic sites, and endangered species</li> </ul>
	Context sensitive solutions	<ul style="list-style-type: none"> <li>• Establish and meet design standards that maximize the visual harmony of and minimize the noise produced by transportation system investments.</li> </ul>

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## **2.0 Creating the Arizona Context**

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The Arizona Department of Transportation (ADOT) consulted several sources to provide context for the development of a strategic direction for the MoveAZ Plan. These included:

- A comprehensive review of transportation planning and visioning efforts in the state;
- A review of additional official planning documents from Arizona agencies and research institutes with mandates other than transportation, such as economic development and commerce;
- A focused survey of Southwestern and Rocky Mountain states that could be considered peers of Arizona;
- A review of planning activities in states that have pioneered vision-based transportation planning; and
- The commission of four papers that examine specific issues relevant to the future of transportation in Arizona.

These sources were used to articulate the concise mission statement above and to create an initial strategic direction that will guide development of the MoveAZ Plan. This section provides a summary review of each of these key sources.

### ■ 2.1 Summary of Review of Transportation Plans

Previous planning efforts have already considered the strategic direction for transportation in Arizona, including the *Arizona Transportation Asset Management System Study* and the *State Planning and Research 542 Study* (Congestion Management Strategies) currently under development by ADOT. Several previous planning efforts developed a transportation vision for the state. These attempts included work by ADOT, the Governor's Office (notably the Transportation Vision 21 Task Force), metropolitan planning organizations, councils of governments, small area studies, and American-Indian reservations. These vision statements provided the raw material that was shaped into the mission statement, goals, and objectives.

This section summarizes our review of over 100 plans produced by ADOT and other agencies, including numerous statewide planning efforts, 33 corridor-specific and various small area plans, metropolitan plans, and Native American plans. Of the plans identified, 27 had identified some element of a vision statement. The review revealed several

important factors that can help to shape the transportation strategic direction for Arizona. Although most of these plans are concerned with smaller areas of the state, the review of them together presents factors that are relevant at the state level. Many of these plans did not include development of a vision statement as their primary task, but each has elements that can be used to inform the development of a strategic direction for transportation in Arizona. This review was also conducted to ensure the coordination of the MoveAZ Plan with current ADOT planning studies, including the *Arizona Transportation Asset Management System Study*.

Table 2.1 presents a summary of the elements discussed in the reviewed planning efforts by different agencies. For each agency level, several planning efforts were examined to determine the relevant set of factors for a mission statement as well as goals and objectives. For each cell of the table, a mark indicates how many of a given type of plan (ADOT, small area, regional, tribal, or other) mentioned a particular element.

**Table 2.1 Elements of Past Strategic Direction Efforts**

Element	ADOT	Small Area	MPO	Tribal	Other
<i>General Elements</i>					
Balanced/multimodal	◆	◆	◆		◆
System inventory	◆	■		■	
<i>Transportation Elements</i>					
Accessibility, mobility		◆	■	◆	■
Safety		■	◆	◆	
Funding flexibility, local control					■
Stable, equitable funding	◆	◆		■	■
<i>Connection to Other Factors</i>					
Land use connection	◆	◆	■	■	◆
Environmental	◆	■	◆	√	■
Economic development	◆	√		√	
Tourism, recreation		◆		◆	
Social issues				√	
Community character		■		◆	■

■ - A few mentions; ◆ - Several mentions; and √ - All or nearly all plans mention.

Plans from most levels of government encouraged the development of a balanced, well-integrated multimodal transportation system. The features of this system clearly included connections to land use, environmental, and economic planning. Additionally, past efforts make note of the need to provide a safe, accessible system that provides for easy



mobility in both urban and rural areas. Rural areas often have different needs than urban areas and the MoveAZ Plan will be sensitive to these differences. American-Indian reservation plans, in particular, tended to raise somewhat different, though overlapping, concerns than other plans. A more detailed review of how each type of plan described the major themes presented in Table 2.1 can be found in Appendix A.

## ■ 2.2 Summary of Other Arizona Context Items

In addition to the review of transportation plans, a more general understanding of the Arizona context was determined through the review of plans from non-transportation agencies in Arizona. This review describes the major issues that will face the state in the coming years. The larger context was created from reviews of the following sources:

- An analysis of statewide planning documents prepared by Arizona departments (Commerce, Economic Security, Land, and Environmental Quality). These included yearly strategic vision statements that each agency produces for the Governor’s Office of Strategic Planning, as well as current long-term planning efforts.
- Discussions with key staffs of the above agencies on current long-range planning efforts and issues facing these departments.
- Reviews of current policy analyses focused on Arizona produced by the Morrison Institute of Arizona State University in Tempe, the Office of Economic Development of the University of Arizona, and the Economic and Business Research Program of the Eller Business School at the University of Arizona.
- A set of four papers contracted specifically for the MoveAZ Plan that addressed current issues in the areas of security, national and global trade, land use, and a general examination of future trends. Each of these papers reflects upon key issues that may likely affect Arizona’s future transportation system and transportation planning. An overall synthesis of these papers can be found in Appendix B.

This section presents a summary of these items consolidated into the following themes:

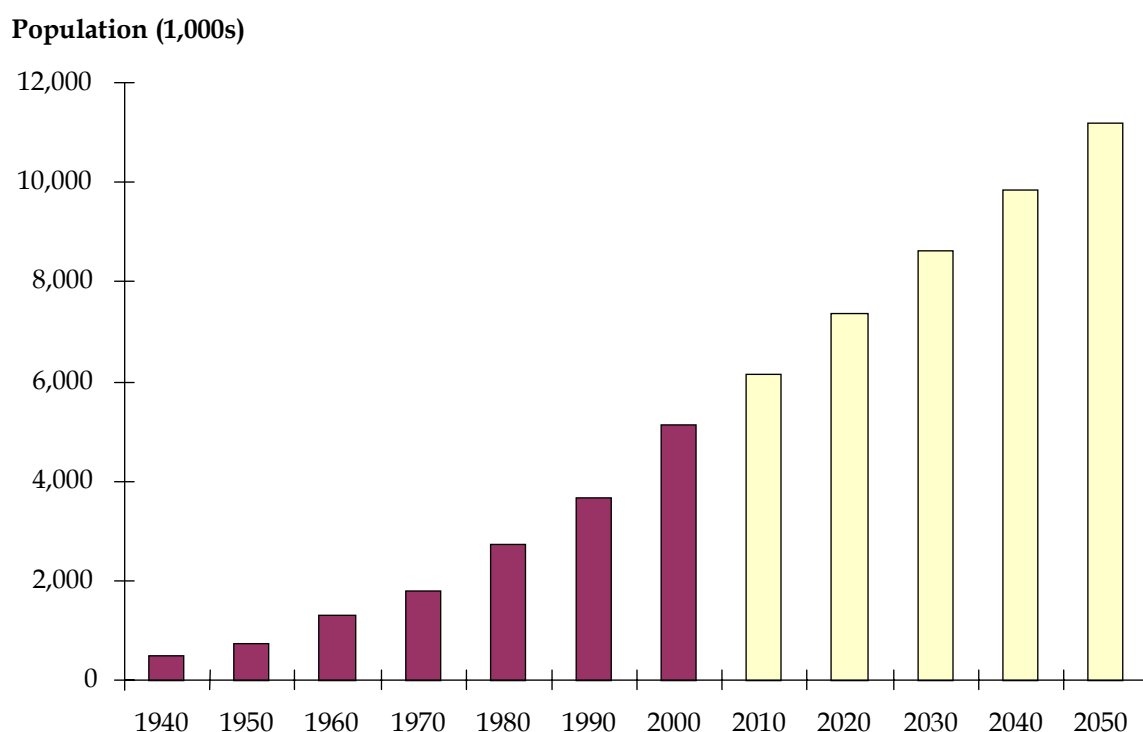
- Population growth;
- Economic change;
- Environmental pressures; and
- Quality of life.

This section presents an analysis of each of these key themes, suggests links to transportation issues, and provides a list of “threats and opportunities” that Arizona’s transportation system will face in the coming years.

## 2.2.1 A Growing State

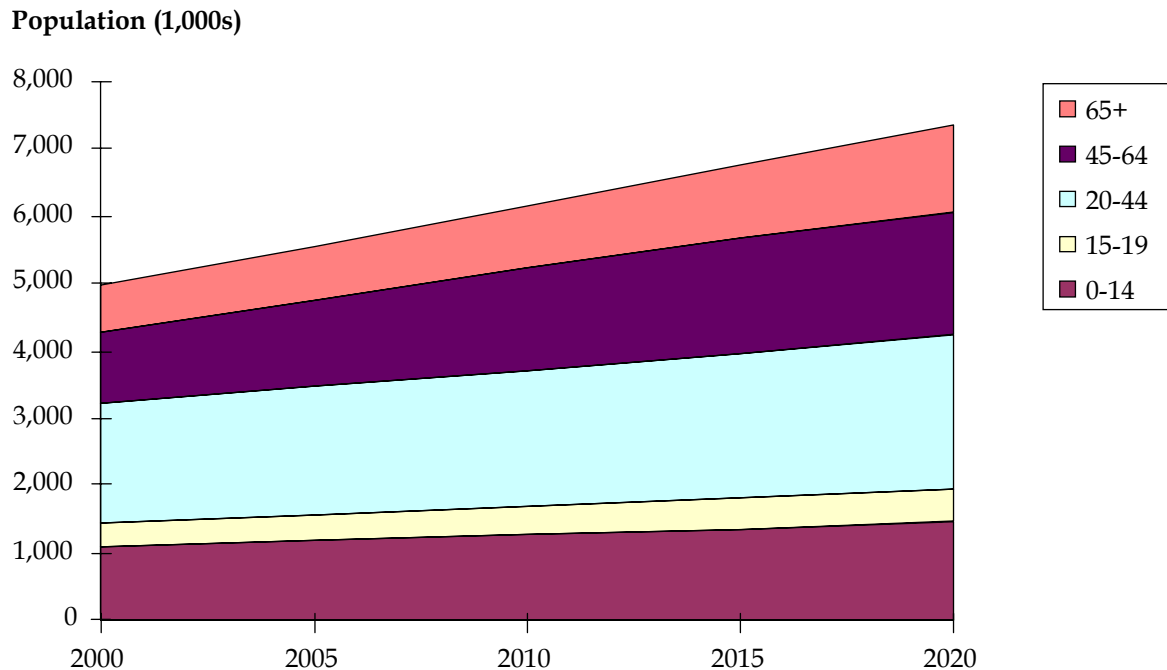
Arizona has been among the fastest growing states in the U.S. every decade since the 1960s. The state grew from 250,000 people in 1950, to over five million as reported by the 2000 census. Current population projections by the Arizona Department of Security show an increase of another 2.5 million people by 2020. Much of this growth is anticipated to take place in the Phoenix metropolitan area, which has added over two million people since 1970; and is currently home to nearly three million.

**Figure 2.1 Historic Population Growth with Future Estimates**



The composition of Arizona's population is changing as well. Like many states in the southwest, Arizona is a major destination for Mexican and other Latin-American immigrants. On average, these immigrants have somewhat less education, are younger, and have larger average household sizes than Arizona's historical population base.

Population growth and change have significant implications for land use planning and its relationship with the transportation system in Arizona. Encouraging coordinated planning between land use and transportation planning could improve Arizona's ability to address the transportation needs of millions of new residents over the next 40 years.

**Figure 2.2 Projected Age Distribution of Arizona's Population**

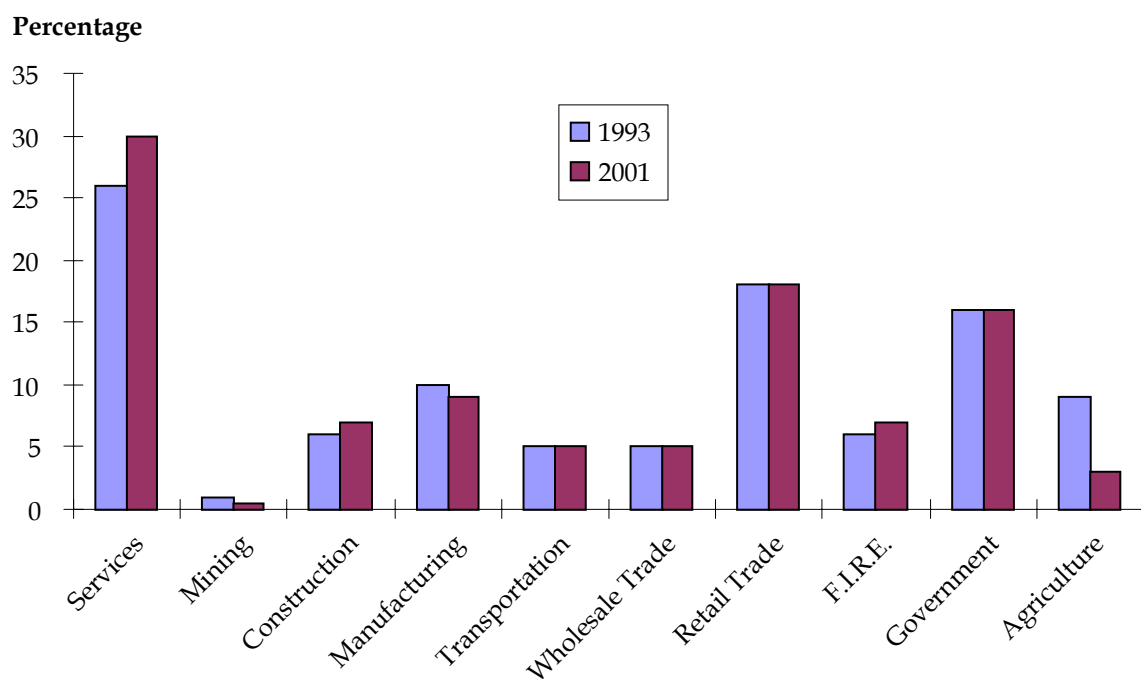
### 2.2.2 A Changing Economy

Economic growth has largely maintained pace with population growth in Arizona. The University of Arizona Economic and Business Research Program projects a four percent annual growth in jobs over the next several years. Over 70 percent of jobs, personal income, and sales take place in the Phoenix metropolitan area and an additional 15 percent in the Tucson metropolitan area. The economic development needs of most of the rest of the state are quite different than these primary metropolitan areas. Phoenix and Tucson are manufacturing centers and attempt to attract high-tech development. Other areas, including Flagstaff, the I-17 Phoenix-Flagstaff corridor, and Sierra Vista are pursuing high technology and “new economy,” knowledge-intensive jobs. Much of the rest of the state relies upon recreation-based employment, tourism, and services for retirees. Agriculture and mining also continue to play important roles in the economy as they have throughout Arizona’s statehood. The opportunities for international trade are growing.

The Arizona Department of Commerce has developed several planning efforts in recent years to help guide economic development in the state. The Arizona Strategic Planning for Economic Development turned state economic planning towards the development of clusters of related businesses that rely upon the same technologies, inputs, employees, and infrastructure. The Arizona Partnership for the New Economy looked at how technological change affects the Arizona economy and identified ways to incorporate these changes.

Outside of the Arizona Department of Commerce, the Arizona Mexico Commission developed a framework to improve cross-border economic linkages through increased trade and supply chains.

**Figure 2.3 Arizona Employment by Industry**



The Arizona Strategic Planning for Economic Development process identified 11 key industrial clusters that represent the potential strengths of the Arizona economy. These can be grouped into three basic types:

1. Technology and knowledge-based work;
2. Service intensive industries focused on tourism and retirees; and
3. Agricultural and mining industries.

These industry clusters are regionally specific and point the state in different directions. On the one hand, the technology-related clusters strive to make connections to research, attract talented 'knowledge' workers, and provide fertile locations for new cutting edge business to develop. On the other hand, the service and other clusters rely heavily upon manual labor and produce numerous, relatively lower-wage jobs.

Through the Arizona Partnership for the New Economy and other efforts, the state has solidified its commitment to understanding how technology has changed business in Arizona. This effort is aimed at developing Arizona as a leader in the new economy. The focus of the Arizona Partnership for the New Economy is on the way technology changes

how regular business is done in Arizona and what it takes to attract these businesses and workers to Arizona. Studies by the Arizona Partnership for the New Economy and the Morrison Institute note that knowledge workers are highly mobile and sophisticated consumers of place. They choose places with a high quality of life, including schools, mobility, and access to recreation, and other social, cultural, and physical amenities. This increases the pressure on designing cities and regions in ways that attract people who make many of their location decisions (e.g., residence, work place, and recreation) based on quality of life.

The other major economic planning effort in the state, the Arizona Mexico Commission, has worked to encourage Arizona as a location for increased trade with Mexico. Arizona is positioned to capture a large share of NAFTA traffic and to develop strategic linkages of suppliers to Maquiladora factories in Mexico. The Arizona Sonora project at the University of Arizona Office of Economic Development notes that an important window of opportunity is open to develop these relationships.

A related economic issue for Arizona is the movement of freight. Population and economic growth, combined with national and international changes in goods production and movement, make freight movement a major issue for Arizona. At the same time, freight growth is following new patterns. Growth in small parcel shipments means more additional less-than-truckload shipments and possibly different types and numbers of trucks on the road. One of the largest components of growth in freight traffic in recent years has been an increased number of small parcel delivery trucks moving over regional highway and arterial networks.

### **2.2.3 Environmental Pressures**

The Arizona Department of Environmental Quality, the agency responsible for regulating and enhancing environmental quality, has been active in pursuing programs to improve the environment of Arizona. Throughout the state, air quality has improved considerably. Few areas of the state are out of compliance with federal air and water quality standards, and the state has made significant improvements in many areas.

The anticipated continuing influx of people and economic activity will inevitably increase pressure on Arizona's environmental resources, however. As the population center of the state, Phoenix and the Maricopa region face the greatest challenge to maintaining air and water quality. The main markers of poorer environmental performance are in Phoenix, where visibility has decreased due to air pollution over the past several years. Phoenix also has a well-known heat island effect; the Morrison Institute reports that average summer night temperatures have increased by 10 degrees over the past 30 years.

Arizona also faces important concerns about land preservation. Arizona has passed several laws in recent years aimed at preserving open space and improving the planning process. The following laws implement a form of Smart Growth that has become increasingly popular in the United States:

- The Arizona Preserve Initiative (1996) created a fund for the purchase of urban open space. Proposition 303 (1998) added \$20 million to this fund.
- The Growing Smarter (1998) and Growing Smarter Plus (2000) Acts sought to improve the local land use process by requiring regular re-adoption of general plans, citizen review of rezoning, coordinating local and state land use planning, and adding several new planning elements to most local general plans (open space preservation, growth areas, environmental planning, water resources, and cost of development). The later act also required the establishment of infrastructure service boundaries and limited the powers of annexation.

## 2.2.4 Quality of Life

Changes to the population, economy, and environment all put attention on what the Morrison Institute refers to as the new emphasis on quality of life. Employees are becoming more conscious of the places they choose to work, with location as important as other traditional job selection criteria. Residents also want more out of the towns and regions they live in, including access to open space, recreational opportunities, and cultural amenities. More recent retirees of the baby boom generation also tend to be better educated and want more from the places they live. Overall, quality of life issues sit in the forefront of policy decisions and provide a guiding principle for strategic planning initiatives for all departments.

## 2.2.5 The Link to Transportation

Each of the above areas of concern bears significant relationships to transportation. Population influx puts pressure on all aspects of government, not least the transportation system. Phoenix already faces serious congestion problems that are likely to intensify. A Morrison Institute report, *Hits and Misses: Fast Growth in Metropolitan Phoenix*, notes that Phoenix is consuming land at a rapid rate and running into problems with the transportation system, access to open space and environmental resources, and economic and racial inequality. This report also notes that key transportation and land use decisions will be made for Phoenix in the next several years as the city decides where to locate businesses and residences and how to connect people to their jobs.

Further, the changing makeup of the population affects the evaluation of transportation needs in the state. With many immigrants less well off than the average Arizonan, the right mix of public transit and highway services will be a more prominent consideration than in the past.

Infrastructure investment plays a key role in economic development. Each of Arizona's economic planning initiatives highlights the important role of transportation for maintaining and enhancing Arizona's business environment:

- One of the Arizona Department of Commerce’s strategic planning goals is “To contribute coordinated resources to enhance the state’s physical infrastructure, increase the availability of affordable housing, and promote the intelligent use of resources.”
- The Arizona Strategic Planning for Economic Development process includes physical infrastructure as one of seven key foundations for developing industrial clusters, citing “The fundamental public facilities such as roads and mass transit ... which transform raw land into a quality place to live and do business.”
- A recent Arizona Partnership for the New Economy briefing note, “A well-maintained infrastructure, from airports to roads – for the movement of goods and people – is an important element of the new economy. Entrepreneurial activity is often more concentrated around areas with accessible and efficient airports.”
- The University of Arizona Office of Economic Development lists advanced transportation infrastructure as one of five key areas for evaluating Arizona’s competitiveness in capturing increased trade and economic development opportunities with Mexico.

### **2.2.6 The Urban/Rural Dichotomy in Arizona**

Nearly two-thirds of Arizona’s population live in metropolitan Phoenix. Arizona’s four largest metropolitan areas (Phoenix, Tucson, Yuma, and Flagstaff) account for over 85 percent of the state’s population. Compared to other similarly-sized Western states, Arizona’s population is much more highly concentrated. Only Nevada, with over three-quarters of the population in Las Vegas and 95 percent in Las Vegas and Reno, is more concentrated. Utah, Colorado, and Washington all are somewhat less concentrated, though nearly 60 percent of these states’ residents live in the largest metropolitan area. Idaho and New Mexico have much lower concentrations of residents in their largest urban areas (33 and 40 percent, respectively). Similarly-sized states in the South and Midwest are much less concentrated, with only 20 to 30 percent of their populations living in the largest metropolitan area.

State transportation planning should remain cognizant of two fundamentally different sets of issues and challenges facing urban and rural Arizona – persistent challenges to rural transportation systems and evolving challenges to urban areas. The future threats to the system listed above are largely urban threats. Continuing issues with mobility and other issues in rural Arizona remain on the agenda, and the state will need to be aware of its efforts to deal with them. But we believe the issues in rural areas are much less dynamic, that is, will change far less over the timeframe of the plan. Similarly, we need to consciously address the question of what is the appropriate level of attention, effort, and resources to assign to the rural (non-interstate) transportation system.

## 2.2.7 Threats and Opportunities

As a state undergoing substantial changes to its population, economy, and environment, Arizona faces a series of challenges to its transportation infrastructure. These changes and challenges create threats to the transportation system that ADOT will likely face as it undertakes any major planning effort. While the discussion above outlines these threats in general terms, the following points offer more specific examples of threats and challenges facing Arizona in the future. This information will be used to help craft generalized goals (e.g., “Protect functionality and performance of freight corridors”) and objectives (e.g., “Minimize the impact of local congestion on highways that serve major intrastate and interstate freight movements”).

- The I-10 corridor is the major corridor for the movement of domestic freight from Texas to California. Passing through Phoenix, this corridor will be substantially affected by increases in population, trade, and traffic congestion in the Phoenix metropolitan area.
- Arizona’s largest trading partner (by value) is Asia (32 percent), not Mexico and Latin America (combined 26 percent). Continued growth of Southern California ports has a direct effect on Arizona’s economic position.
- U.S. Route 95 in Yuma County and I-19 near Nogales represent potential major corridors for the movement of international trade. As Arizona pursues a strategy to connect manufacturing in Sonora, Mexico to suppliers in Arizona, these facilities will face increasing strains.
- International goods movement through these corridors will also put additional strains on roadways in and around Phoenix and Tucson as they make their way to destinations in other states.
- A joint planning effort by Arizona, several other U.S. states, Canada, and Mexico identified the CANAMEX corridor as a major north-south route NAFTA-related goods movements between the Mexico, the United States, and Canada. This passes through Arizona and provides important opportunities for the development of international and national freight movements and economic development in Arizona.
- The Phoenix metropolitan area is the most populous area of the state and is growing rapidly. Phoenix will face major challenges on its ability to maintain the efficient movement of residents to and from their jobs. To a somewhat lesser extent, residents of Tucson, Flagstaff, and Yuma face similar issues.
- Phoenix was chosen in 1996 as one of four ITS Model Deployment Initiative sites. Through several planning efforts, ADOT and the Maricopa Association of Governments have developed a strategic plan for ITS deployment. These planning efforts and the resulting ITS architecture provide opportunities for enhancing the movement of automobiles and freight in the Phoenix metropolitan area.



- Changing technologies and oil production could have massive effect on the use of Arizona's primary mode of transportation, the automobile. An oil shock could substantially impair the ability of Arizonans to get around the state. At the same time, improving fuel technologies can lower the financial and environmental costs of using automobiles.
- Natural features and American-Indian reservations put constraints on the growth in the Phoenix metropolitan area. Most new development will likely occur to the west and north along the I-17 corridor. This new development may cause increased strain on the current transportation system as access to certain major destinations – downtown Phoenix for example – becomes more congested.
- Arizona's metropolitan areas, Phoenix in particular, have relatively limited transit services. Phoenix has a one-half or a one-third the per capita miles of transit service as other similarly-sized western cities, according to a recent Morrison Institute report. As a major destination for immigrants with somewhat less education, income, and lower rates of auto ownership, urban Arizona will feel increased pressure to improve its current transit system. Some notable steps are being made to improve transit service. The new light-rail line in Phoenix is an example of this, though its service catchment area does not include many lower-income neighborhoods.
- Arizona's smaller metropolitan areas also face growth constraints and challenges from a changing economy. According to current economic planning efforts, Flagstaff, the I-17 corridor between Phoenix and Flagstaff, and Sierra Vista in Southeastern Arizona are seen as viable destinations for high-tech, back office, and related industries. (A major call center was recently located in Sierra Vista.) Transportation facilities in these areas may require some special attention to cope with a changing economy.
- Growth in Arizona's metropolitan areas presents threats to the desert ecosystem that is one of the major factors of Arizona's high quality of life. Arizona's transportation infrastructure can play an important role in preserving quality of life through linkages with effective land use planning and open space preservation efforts.
- Three-quarters of Phoenix residents drive single-occupant vehicles (SOVs) to work. Similar SOV usage occurs in the Tucson region. With explosive population and economic growth likely to continue over the next several decades, these habits will create serious threats to the improvements in air quality realized over the last several decades. Phoenix and other metropolitan areas will have to evaluate policies on transportation demand management strategies, including ridesharing, land use development, and parking management policies, as central business districts become more congested.
- New standards for air quality – an eight-hour ozone standard and a fine 2.5-micron particulate meter standard – will create compliance issues for Phoenix and some other areas of the state, presenting a challenge to the transportation system and to funding.

- All of Arizona's governmental programs face threats from the narrowness of the tax base. Sales tax revenues comprise 62 percent of Arizona's local tax base, compared to over 27 percent nationally. A Morrison Institute report, *Five Shoes Waiting to Drop on Arizona*, notes that reduced income taxes and vehicle license fees, combined with numerous exemptions, have created substantial challenges for every Arizona state department.
- Arizonans see serious threats to their quality of life. In a 1999 survey by the Morrison Institute, nearly one-half of all Phoenix metropolitan area residents said they would leave the metropolitan area if they could. Residents give poor marks to many aspects of the region's infrastructure, including the transit system; and a majority of residents think that the quality of life has worsened in recent years. Though transportation is only one piece of this puzzle, it points towards the importance of paying attention to quality of life issues.
- Arizona, like other states, faces increased concerns about security and terrorist threats. These threats have not taken concrete form in Arizona, but they will continue to shape the face of planning over the next several years.

These key threats and opportunities provide the context for the long-range plan. A synthesis of the information that comes directly from the synthesis of the issues papers can be found in Appendix B.

## ■ 2.3 Examples of Other Statewide Vision Processes

In addition to building a strong understanding of the context for planning inside Arizona, we sought to understand the larger planning context within which the state is operating. Because every state in the U.S. must produce a long-range transportation plan and update it regularly, there are numerous possible states to use as benchmarks for statewide planning. We chose to look at two groups of states for their relevance to the MoveAZ Plan:

1. States that, geographically speaking, are peers of Arizona and may face some of the same general issues with population growth, economic change, and others described above; and
2. States that have pioneered vision-based transportation planning and may provide examples that Arizona would like to emulate.

This section presents a review of both of these exercises.

### 2.3.1 Review of Peer States

A survey of other Southwestern and Rocky Mountain states revealed that most states are thinking about or starting to develop vision-related planning processes. Only Idaho has

already completed a visioning process, and both New Mexico and Utah are in the early stages of developing strategic visions for their states.

Each of these states has a different process for creating a strategic vision. Utah is at an early stage of plan development; they have nearly completed an internal review of past studies and developed a preliminary vision statement that will undergo public review in the next several months. In this respect, the process used in Utah is similar to that selected by ADOT. New Mexico is using a decentralized process, in which each of seven regions will develop separate vision statements in the process of updating the New Mexico statewide plan.

### ***Utah***

Utah is currently in the process of updating their statewide plan. Part of this process involves developing a strategic vision for transportation. At this point, they have completed an internal process to develop a vision that involves the Utah Department of Transportation (UDOT) employees and representatives from regional planning organizations and traffic safety groups. No documents are publicly available yet, but once the internal work on the vision is complete, the UDOT will start a public involvement process. The vision was developed from previous public involvement processes.

The basic elements of the vision include mobility and access, safety, and a maintenance first approach with additional projects planned based on realistic funding possibilities. They also have developed at the center of their vision a “context sensitive solutions initiative.” This initiative is part of a federal pilot project on context-sensitive design, which the UDOT has expanded to include the entire planning process. The UDOT involved stakeholders at the beginning of given planning process to enable more efficient planning development.

### ***New Mexico***

New Mexico is currently in the process of updating their statewide plan. They plan to include a vision development process in this update, but are still preparing that process. The update of the plan will take place regionally, with each of seven regional planning organizations undertaking its own public involvement and visioning processes. This process is at an early stage of development.

### ***Idaho***

Idaho has a transportation planning effort dating from 1995 that develops a transportation vision, goals to reach that vision, and objectives and strategies to achieve those goals. The plan also required the development of performance measures to assess the attempt to reach the goals.

Three basic issues guided the development of the Idaho transportation vision – economic development (increased trade, tourism, travel, and communication); growth management (coordination of transportation and land use); and air quality. The Idaho’s process was

bottom up – they relied on work already done by regional planning organizations that was then used to develop the issues, vision, and goals.

The vision statement developed by the Idaho DOT: *Idahoans in the future will see a modern, balanced, and integrated multimodal transportation network that is efficient, safe, and protects and enhances the environment. This system will be managed to address future traffic growth, improve air quality, and use energy more efficiently.*

### 2.3.2 Vision-Based Planning Pioneers

Four states were chosen as examples of different ways to conduct vision-based planning. These states used a process similar to that of Arizona, involving the development of a strategic direction that forms the foundation for the plan. These states provide different ideas about the best way to develop a vision or mission statement. The four state plans selected for this review included:

1. Washington State Transportation Plan (2001);
2. Pennsylvania DOT: Strategic Performance Measurement (2000);
3. Florida Transportation Plan (1995); and
4. Oregon Transportation Plan: Policy and Multimodal System Elements (1992).

These four states each had fairly different experiences developing their vision-based plans.

Washington used the vision process to produce multiple alternative visions that were presented to regional planning organizations, the governor's office, key stakeholders, the business community, and residents. WashDOT produced two alternate scenarios: 1) a trend scenario that allowed development to continue as it was and 2) a livable future that identified a balance of key elements that statewide planning should consider. For Washington, the key elements included "vibrant communities," a "vital economy," and "a sustainable environment." These three vision principles formed the structure of a strategic direction and were used to develop vision outcomes and service objectives.

Pennsylvania's performance measurement system includes a relatively simple vision statement that requires PennDOT to provide a transportation system and services that "exceed the expectations of those who use them." To achieve this, PennDOT identified eight strategic focus areas – maintenance, quality of life, mobility and access, customer focus, innovation and technology, safety, leadership at all levels, and relationship building. Each of these eight areas has specific goals for the department to achieve. These include both internal management considerations and external facility conditions concerns.

Florida developed a mission statement that more clearly identifies the specific goals that the Department of Transportation should achieve, including safety, interconnection, mobility, economic prosperity, and environmental quality. Elements of the mission

statement are directly mapped to more specific long-range goals and even more specific long-range objectives.

The Oregon Transportation Plan used a tiered approach that started from a general and became more specific. This includes a policy element, a multimodal system element, a series of modal and multimodal plans, and a series of multimodal corridor plans. The policy element included a fairly general vision statement that acts as the framework for all other components of these plans. The mission statement is further linked to broad goals. The other elements of the plan provide greater specificity for these goals, linking them to more specific objectives, as well as programs and projects.

Each of these states has developed some version of a strategic direction process that provided useful examples for the Arizona statewide plan. The success of these planning efforts is that they provide a relatively clear and concise structure for the organization of long-range planning activities in the state. A more detailed review of each of these states planning processes can be found in Appendix C.

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## **3.0 Data and Modal Profiles to Support the MoveAZ Plan**

## 3.0 Data and Modal Profiles to Support the MoveAZ Plan

In addition to developing the strategic direction, Phase I included the review and synthesis of relevant transportation data sources that will be used to support the development of the MoveAZ Plan. The results of the data synthesis will be used to build a comprehensive multimodal transportation system inventory to support the development and analysis of the programs and projects evaluated as part of the MoveAZ planning process.

The MoveAZ plan will utilize data from ADOT, metropolitan planning organizations and councils of government (MPOs/COGs), and other relevant agencies. A detailed review of the data sources used to create the modal system inventory can be found in Appendix D.

This section also presents the Task 4 modal and system profiles for the MoveAZ Plan. The inventory presents the current Arizona transportation system by the following categories:

- Modal profiles;
- System element profiles; and
- Special land area profiles.

Modal profiles relevant to the movement of passengers and freight are presented below for highway, transit, railroad, aviation, and bicycle and pedestrian modes. Three other key elements of the state's system – international ports of entry, intermodal facilities, and intelligent transportation systems – are presented in the section describing system element profiles. Finally, a summary of transportation systems on federally-owned and federally-recognized tribal-owned lands is presented.

Each summary presents a description of the existing network or system conditions, the utilization and demand of that system, and its performance under the current conditions. The types of data in the inventory used to create the summaries, their sources, and their formats are described in each mode. These data are currently maintained and available for use in the planning process, and will serve as the foundation to prepare the MoveAZ Plan.

## ■ 3.1 Modal Profiles

Modal profile summaries for Arizona's highway, transit, rail, air, and bicycle and pedestrian modes and the transportation system inventory and data for each are presented in this section.

### 3.1.1 Highway

Of all the components of Arizona's transportation system, the roadway network is the largest and most extensively used: most residents and visitors of Arizona travel by private automobile. On average, over 125 million vehicle-miles are traveled per day on Arizona roads.

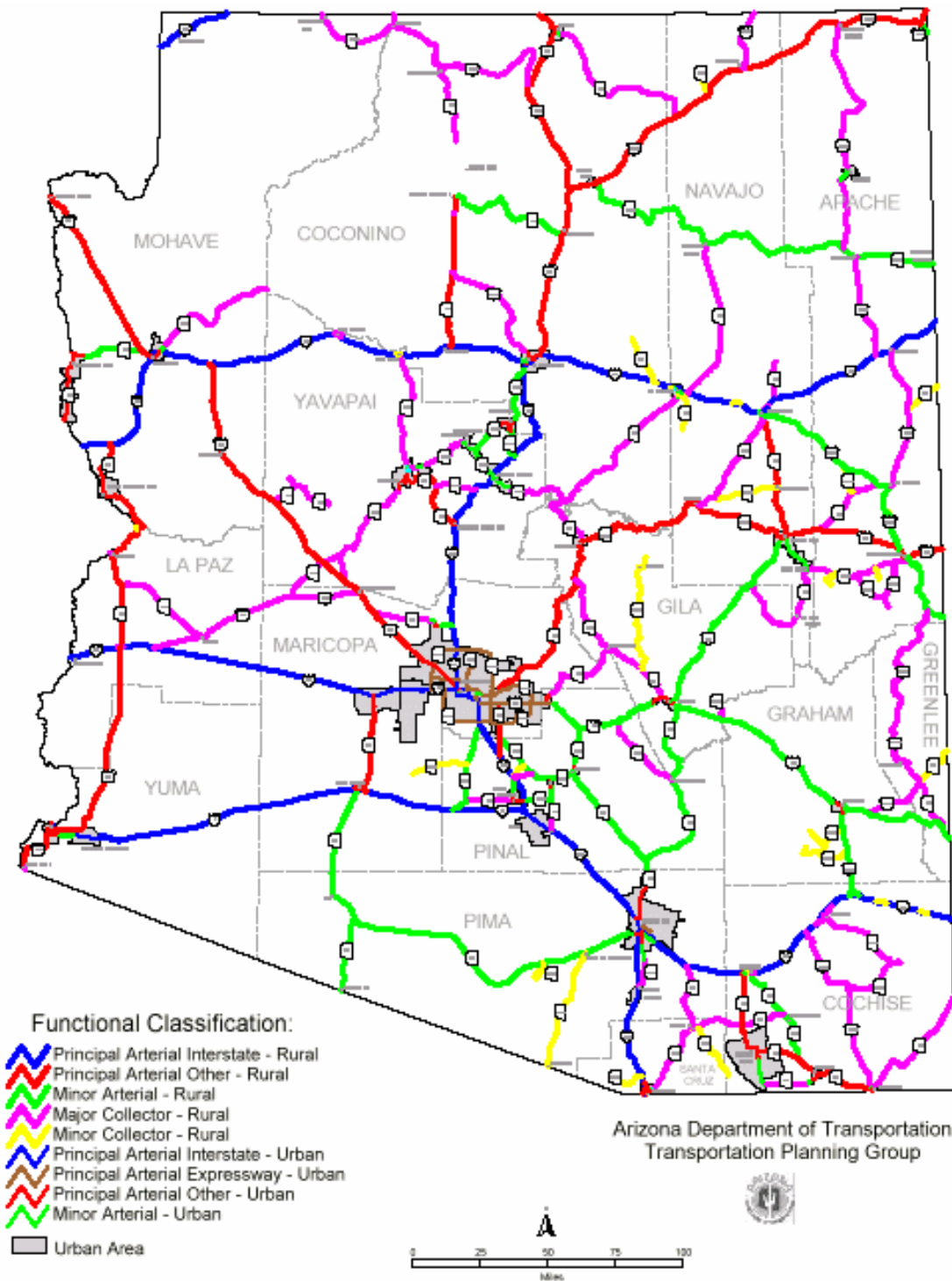
The system consists of over 58,000 miles of roadway, or over 82,000 lane-miles. Two percent of the entire state network are interstate highways, three percent of the road-miles are U.S. routes, and nearly six percent are state routes. Though only 12 percent of the total highway network are owned by ADOT, over 57 percent of the daily vehicle miles of travel (DVMT) occur on these roads. The Interstate System – also owned by ADOT – carries 28 percent of all DVMT. Over the last 10 years, DVMT has nearly doubled on the Arizona state highway system, including interstates. Most of the remaining travel occurs on municipally-owned roads. Figure 3.1 shows the state-owned highway network by functional class, and Table 3.1 lists DVMT and mileage by jurisdiction ownership (federal, ADOT, county, and city).

The roadways in Arizona are in excellent condition. About 79 percent of the ADOT-owned highway network have pavement that is in good or excellent condition, compared to only 52 percent in Colorado. Approximately 99 percent of the Interstate System are in good condition or better; and about 86 percent of other freeways have comparable pavement conditions. Approximately 80 percent of principal arterials are also in good or excellent condition.

In rural Arizona, four percent of DVMT occurred on roads with a level of service (LOS) of "D" or worse. In urban areas, though, almost 14 percent of daily vehicle miles were traveled on congested roads with a LOS of "D" or worse. The Phoenix metropolitan area has some of the highest traffic volumes in the state, with average annual daily traffic (AADT) on some segments of Interstate 10 reaching 265,000 vehicles. This is a significant increase in 193,221 vehicles per day traveling along Interstate 10 in Tempe only 10 years ago. Other western cities, such as Denver, experience highway traffic of a similar magnitude – segments of Interstate 25 in Colorado experienced up to 243,000 vehicles per day.



**Figure 3.1 Arizona State Highway System by Functional Class**



**Table 3.1 Highway Miles and DVMT by Ownership**

Highway Owner	Miles of Highway	DVMT	% of DVMT
Federal (BLM, NFS)	14,744	1,622,509	1.3
State DOT	6,696	71,671,458	57.3
County DOT	19,158	10,792,387	8.6
Municipal DOT	17,499	41,025,676	32.8
<b>Total</b>	<b>58,097</b>	<b>125,112,030</b>	<b>100.0</b>

Source: ADOT HPMS.

About 12 percent of the DVMT in Arizona were a result of truck traffic. Approximately 96 million tons of cargo originating in Arizona were shipped by truck in 1997 (79 percent of all cargo originating in the state), resulting in 10.6 billion ton-miles traveled: a considerable strain on the highway network. As shown in Table 3.2, non-metallic minerals constituted the largest type of commodity moved by truck in Arizona.

**Table 3.2 Truck-Hauled Commodities Originating in Arizona**

Commodity	Tons	Percentage
Non-metallic minerals	18,806,000	19.6
Natural sands	8,430,000	8.8
Foodstuffs, fats, and oils	6,432,000	6.7
Gasoline and aviation turbine fuels	5,611,000	5.8
Gravel and crushed stone	5,000,000	5.2
Other	51,789,000	53.9
<b>Total</b>	<b>96,068,000</b>	<b>100.0</b>

Source: ADOT and BTS.

In 1999, 62,411 injuries and 842 fatalities were reported as a result of highway crashes that occurred in the state. This results in an injury rate of almost 500 per million vehicle miles (MVM), and a fatality rate of about six per MVM.

Table 3.3 presents the sources of information used to prepare the highway modal profile prepared in this report. Additional information obtained in the MoveAZ Plan's technical tasks will be used to supplement this database of current information. For example, the Reebe Transearch Database that considers current commodity movements by truck will be used to supplement the freight data from the Bureau of Transportation Statistics (BTS) used to prepare this inventory. The other primary sources used to develop this modal

profile and system inventory included the Highway Performance Monitoring System (HPMS), Safety Management System, and the Arizona Transportation Information System (ATIS).

**Table 3.3 Highway Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Highway physical condition, operations, performance	HPMS	Database
Highway accidents	ADOT Safety Management System	Database
Highway network	ATIS	GIS
Truck-hauled commodities	BTS	Table

Source: ADOT and Cambridge Systematics, Inc.

### 3.1.2 Transit

While the majority of passenger travel in Arizona takes place by private automobile, public transportation provides an important mobility alternative for those who cannot or choose not to drive. In major cities, such as Phoenix and Tucson, public transportation helps to reduce traffic congestion and improve air quality. Arizona is served by public transportation services ranging from intercity services connecting cities to local services connecting homes with jobs, shopping, medical services, and other destinations. All communities with current transit services are listed in Table 3.4.

#### *Intercity Passenger Bus*

Greyhound Lines provides the majority of long-distance bus service in Arizona in terms of both destinations served and service frequency. Greyhound serves 48 communities, including airport connections at Phoenix Sky Harbor and rail connections at Benson and Tucson. Most of its routes operate in interstate highway corridors, with the greatest frequency of service in the I-10 corridor. Greyhound operates approximately 18 one-way trips per day between Phoenix and Tucson.

There are also five regional bus operators that provide scheduled service, tours, and/or charters. For example, K-T Services operates interline service with Greyhound between Phoenix and Las Vegas. Some rural transit operators, such as Hopi Senom Transit System, Navajo Transit System, and Sunsites Transportation, provide scheduled service to major cities. Some tour companies, such as Gray Line Tours, operate scheduled tours to major attractions from larger cities.

**Table 3.4 Arizona Communities with Transit**

Community	Urban and Regional	Rural and Small Town	Elderly and Disabled	Map Label in Figure 3.2
Apache Junction			X	51
Bisbee		X	X	9
Bullhead City		X	X	6
Camp Verde			X	26
Casa Grande			X	53
Chandler			X	36
Chinle			X	21
Coolidge		X	X	5
Cottonwood		X		13
Douglas			X	17
Duncan			X	43
Eloy			X	54
Flagstaff	X		X	4
Florence			X	52
Ganado			X	22
Globe			X	20
Grand Canyon		X		15
Green Valley			X	30
Hayden			X	40
Holbrook			X	18
Hopi Reservation		X	X	57
Kearny			X	49
Kingman			X	24
Lake Havasu City		X		12
Lakeside		X		14
Mammoth			X	48
Mesa			X	35
Miami		X	X	8
Nogales			X	45
Oracle			X	47
Parker			X	28
Patagonia			X	46
Payson			X	41
Peach Springs			X	55
Peoria			X	37

**Table 3.4 Arizona Communities with Transit (continued)**

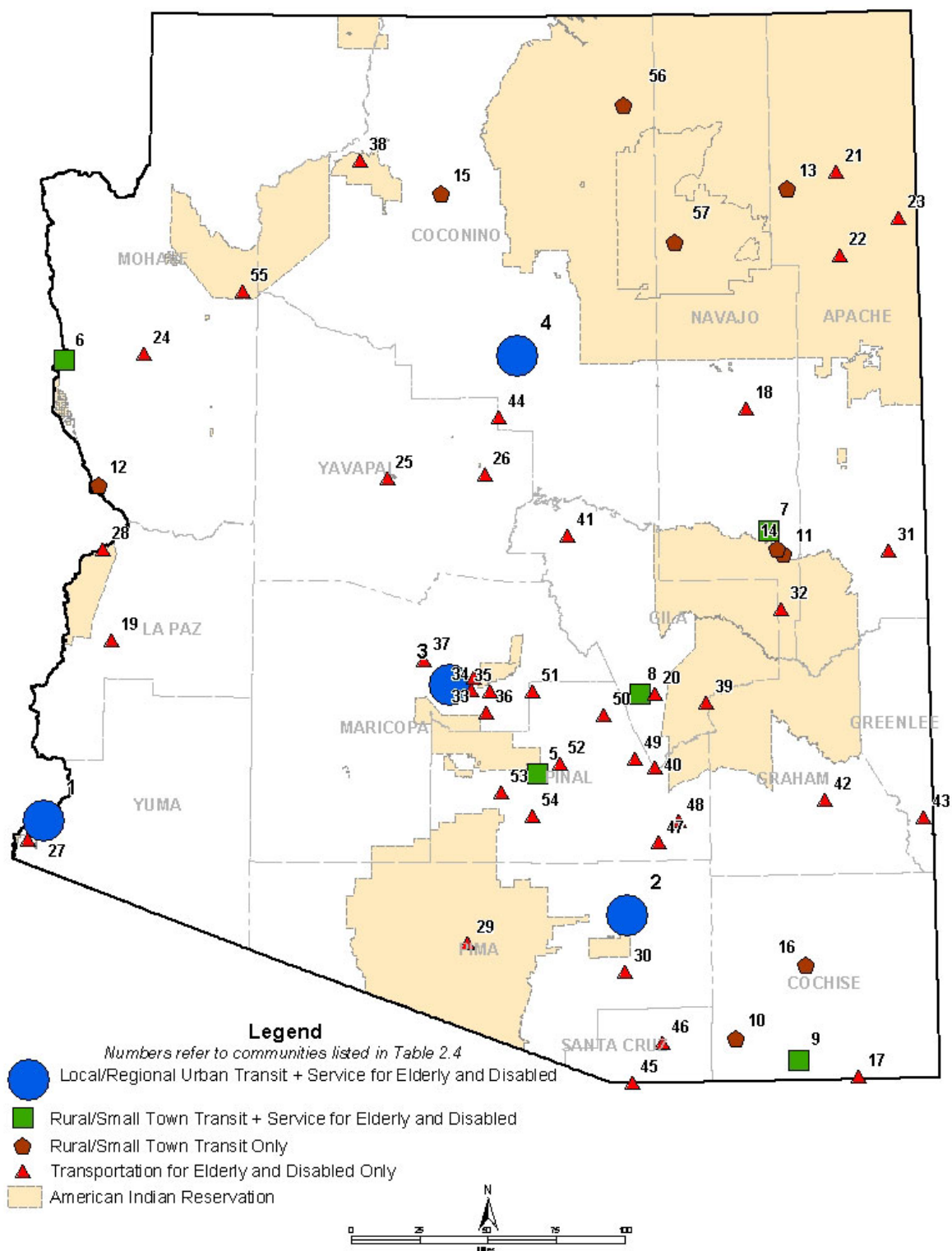
<b>Community</b>	<b>Urban and Regional</b>	<b>Rural and Small Town</b>	<b>Elderly and Disabled</b>	<b>Map Label in Figure 3.2</b>
Phoenix	X		X	3
Pinetop		X		11
Prescott			X	25
Quartzsite			X	19
Safford			X	42
San Carlos			X	39
San Luis			X	29
Sawmill			X	23
Scottsdale			X	33
Sedona			X	44
Show Low		X	X	7
Sierra Vista		X		10
Somerton			X	27
Springerville			X	31
Sunsites		X		16
Supai			X	38
Superior			X	50
Tempe			X	34
Tucson	X		X	2
Whiteriver			X	32
Yuma	X		X	1

Source: Cambridge Systematics, Inc.

### ***Local and Regional Urban Transit***

As shown in Figure 3.2, Arizona has urban public transportation systems in four metropolitan areas with populations over 50,000: Phoenix, Tucson, Flagstaff, and Yuma. In Phoenix, the Regional Public Transportation Authority (RPTA) provides a unified structure for numerous municipal transit services, while operating various services of regional significance. The cities of Phoenix, Mesa, Tempe, Scottsdale, Chandler, Peoria, Gilbert, Glendale, Avondale, and El Mirage participate in the RPTA with Maricopa County. Municipal transit services funded by these cities and regional transit services funded through the RPTA operate under the Valley Metro brand. The Valley Metro system includes 59 fixed routes that operate primarily on arterial streets, 21 limited-stop express routes, and 11 demand response services that provide door-to-door service on request.

**Figure 3.2 Arizona Transit Services**



The RPTA is also sponsoring the design of the state's first light-rail transit system, scheduled to open in late 2006. Municipalities, such as Glendale, Phoenix, and Tempe, also operate circulator services in their central business districts. Arizona State University operates two shuttle routes between its campuses. The Salt River Transit System provides route deviation transit services on three routes and demand response service in rural areas on the fringe of the Phoenix metropolitan area.

The city of Tucson, under the SunTran brand, operates 28 fixed routes and nine limited-stop express routes. Under the VanTran name, the city also provides demand response service to persons with disabilities. The city also operates three circulator routes in the downtown Tucson area known as Tucson Inner City Express Transit (TICET). The University of Arizona operates five CatTran shuttle routes in the vicinity of its Tucson campus. The town of Oro Valley provides the CoyoteRun demand-response service for the elderly, those with disabilities, and those with low income. Pima County operates fixed route transit service on four fixed routes in rural areas surrounding Tucson.

In Flagstaff, Coconino County operates four fixed routes known as Mountain Line Transit. The county also operates the VanGo demand response service for persons with disabilities, but serves the general public when space is available. Northern Arizona University operates Mountain Campus Transit on four fixed routes on and near its campus.

The Yuma Metropolitan Planning Organization (YMPO) operates two fixed routes under the Valley Transit name. The YMPO also operates a demand response service for persons with disabilities.

### ***Rural and Small Town Transit Services***

Thirteen communities in rural and small urban areas of Arizona with under 50,000 people provide transit services that are eligible for federal funding under the Section 5311 program. Transit services in these areas generally operate less frequently and in a more flexible manner than their counterparts in urban areas. Demand response services that provide door-to-door service with advance reservations are provided in Cottonwood, Lake Havasu City, and Miami. Route deviation services in Bisbee, Coolidge, Sierra Vista, and Sunsites operate on established routes, but deviate on request to pick up or drop off customers at locations within a specified service area. The Hopi and Navajo Nations both provide fixed-route service between cities on and around their reservations. The Four Seasons Connection provides fixed-route service on two connected routes, one each in Showlow and Pinetop-Lakeside. In addition, the National Park Service operates free shuttles between parking areas and attractions in the Grand Canyon National Park.

### ***Transportation for the Elderly and Persons with Disabilities***

More than 100 private non-profit and public agencies that provide transportation to the elderly and persons with disabilities are eligible for federal funding for vehicle purchases under the Section 5310 program. Locations of these agencies are shown in Figure 3.2.

Table 3.5 presents the sources of information used to prepare the transit modal profile presented in this report. Additional information obtained in the MoveAZ Plan's technical tasks will be used to supplement this database of current information. For example, the recent analysis of high-speed rail between Phoenix and Tucson and the statewide passenger rail feasibility study will be used to supplement the transit data contained in this profile. The other primary sources used to develop this transit modal profile and system inventory included the National Transit Database (NTD), the American Public Transportation Association (APTA), and information provided by various local agencies and transit operators.

**Table 3.5 Transit Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Vehicle data, system ridership, system expenses	NTD	Database
Transit systems by service area	APTA	Database
Routes, service type, frequency, fare, other operational data	ADOT, city, and transit agency web sites	Database

Source: ADOT and Cambridge Systematics, Inc.

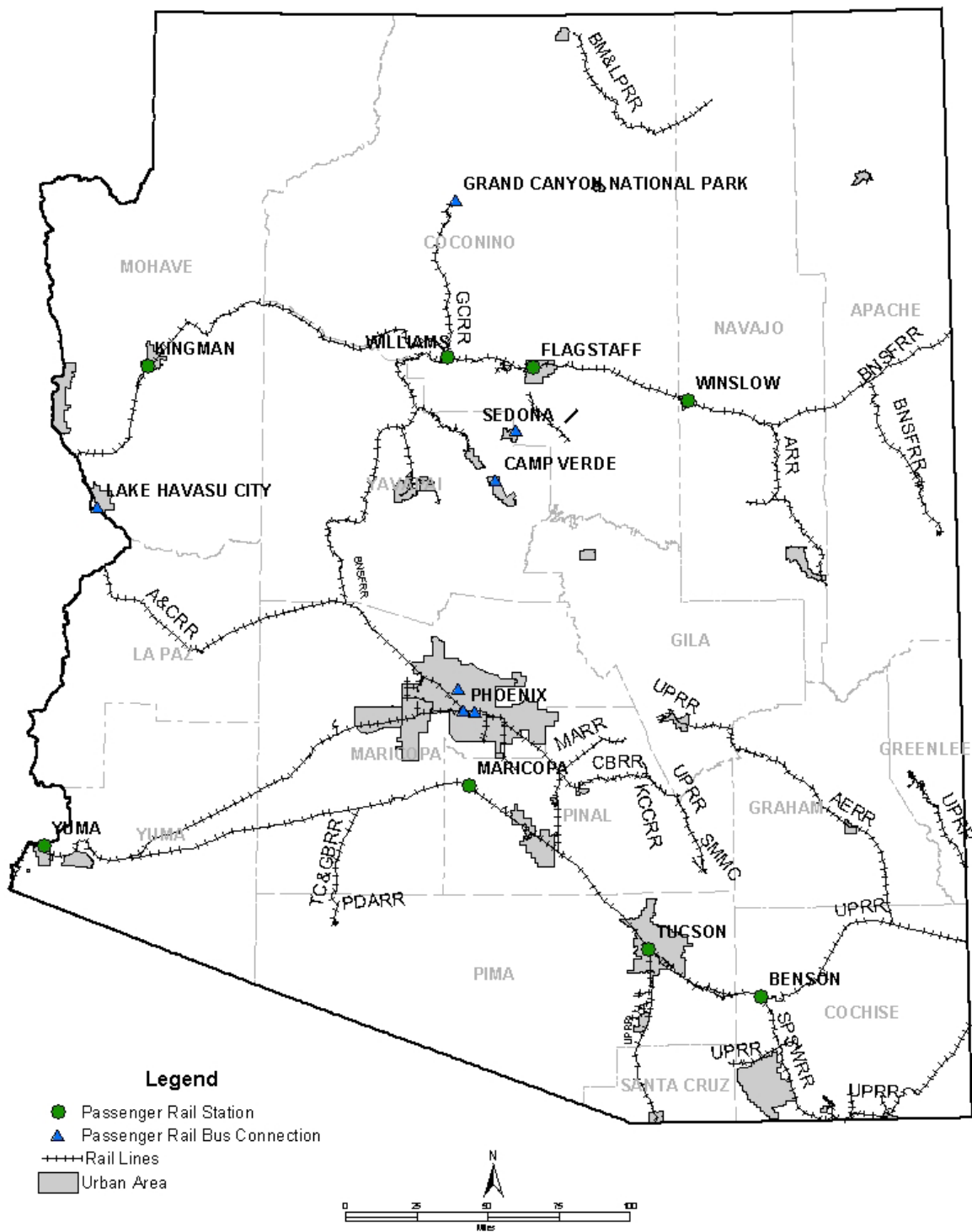
### 3.1.3 Railroads

Arizona currently contains 2,654 miles of actual track, including mainline, spurs, and yards. Railroads operate 1,909 actual route-miles of track. Approximately 738 miles of this network are owned and/or operated by the Union Pacific railway; the Burlington Northern Santa Fe railway owns and/or operates 595 route-miles of Arizona track; and the majority of remaining route-miles are operated by various local and switching and terminal railways. A very small amount of track is operated by the U.S. government or is recreational in nature. All current Arizona rail lines are shown in Figure 3.3. According to the Federal Railroad Administration, there are 1,639 highway-rail crossings in the state of Arizona: 940 of these are public and 692 are private.

In 2000, Arizona freight railways, operated by 2,528 in-state employees, carried 103 million tons of cargo in 4.2 million carloads. The most prominent commodities were glass and stone products, constituting 25 percent of all freight rail commodities originating in Arizona; and coal, constituting 46 percent of all freight rail commodities terminating in Arizona. Actual tonnages for all major freight rail commodities originating or terminating in the state are listed in Table 3.6.



**Figure 3.3 Arizona Rail Lines and Passenger Stations**



**Table 3.6 Commodities Originating and Terminating in Arizona (2000)**

Tons Originated			Tons Terminated		
Commodity	Tons	%	Commodity	Tons	%
Glass & Stone Products	1,433,216	25	Coal	11,351,213	46
Metallic Ores	935,096	16	Glass & Stone Products	1,895,112	8
Primary Metal Products	847,620	15	Chemicals	1,804,376	7
Waste & Scrap Material	544,928	9	Farm Products	1,506,564	6
Chemicals	423,472	7	Lumber & Wood Products	1,358,880	6
Other	1,647,591	28	Other	6,787,972	27
<b>Total</b>	<b>5,831,923</b>	<b>100</b>	<b>Total</b>	<b>24,704,117</b>	<b>100</b>

Source: American Association of Railroads.

Amtrak provides intercity rail services on two east-west routes through Arizona. The Southwest Chief provides daily service between Chicago and Los Angeles with stops in Winslow, Flagstaff, Williams, and Kingman. The Sunset Limited between Orlando and Los Angeles and the Texas Eagle between Chicago and Los Angeles each provide service three days per week with stops in Benson, Tucson, Maricopa, and Yuma. Eight other Arizona locations are also accessible to these lines via bus connections.

The majority of passenger rail stations in terms of facilities are in Tucson and Flagstaff. Total annual passengers passing through these stations were 25,700 and 44,900, respectively, in 2000. Annual passenger counts for all Arizona rail stations are listed in Table 3.7. Station locations are depicted in Figure 3.3.

The Grand Canyon Railway and Resort operates one round trip per day between Williams and the Grand Canyon National Park. The service connects with Amtrak at Williams, but its schedule is not coordinated with the national trains.

Higher-speed rail has been a subject of study for more than a decade. In 1998, ADOT completed a feasibility study for rail services in the Phoenix-Tucson corridor that would be faster than highway travel. The study recommended a phased introduction of passenger service along the existing Union Pacific freight railroad alignment that includes minor track upgrades and trains running at up to 100 miles per hour with conventional diesel-electric locomotives in the short term. Over time, a partially elevated electric railway would be constructed that would minimize conflicts with freight trains and permit operating speeds as high as 125 miles per hour.

In 2000, 60 rail-related accidents occurred in the state of Arizona, three of them at highway-rail crossings. As a result of these accidents, six people died and another 10 people were injured.

**Table 3.7 Annual Passenger Rail Counts in Arizona**

<b>Railway</b>	<b>Station</b>	<b>Passenger Count</b>
Sunset Limited (UP)	Benson	1,900
	Tucson	25,700
	Yuma	2,500
	Phoenix (connecting bus service)	7,950
Southwest Chief (BNSF)	Flagstaff	44,900
	Kingman	3,100
	Winslow	2,200
	Grand Canyon (connecting bus service)	400
	Phoenix (connecting bus service)	450
Grand Canyon Railroad	Grand Canyon	19,000
	Williams	5,000
Arizona Central Railway	Clarkdale	7,200
<b>Total</b>		<b>120,300</b>

Source: ADOT.

Table 3.8 presents the sources of information used to prepare the railroad modal profile prepared in this report. Additional information obtained in the MoveAZ Plan's technical tasks will be used to supplement this database of current information. For example, as with the highway mode, the Reebie Transearch Database will be used to supplement the railroad freight data used to create this profile. The other primary sources used to develop this modal profile and system inventory included the Bureau of Transportation Statistics, ADOT, Amtrak, Federal Railroad Administration, and the American Association of Railroads.

**Table 3.8 Rail Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Amtrak station locations	BTS	GIS
Amtrak ridership	ADOT	Table
Amtrak route information	Amtrak web site	Text
Rail line locations	BTS	GIS
Rail-highway intersections	FRA	Table
Rail ownership	AAR	Table
Rail accidents	FRA	Table
Rail-hauled commodities	AAR	Table
High-speed rail proposal characteristics	Arizona High-Speed Rail Feasibility Study	Text

Source: Cambridge Systematics, Inc.

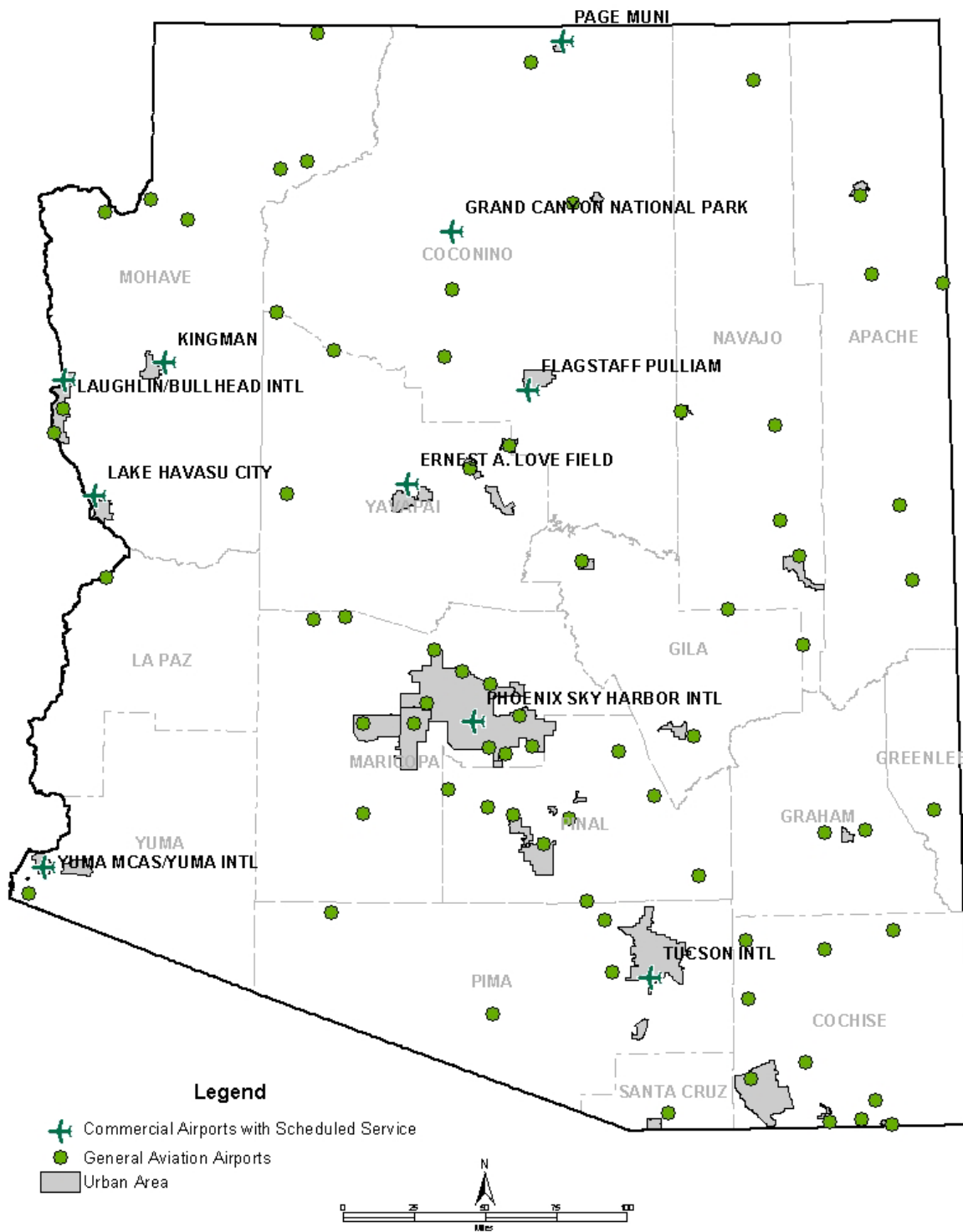
### 3.1.4 Aviation

Arizona contains 83 public-use airports: 65 of these are publicly owned, one is owned by the U.S. Army, one is owned by the U.S. Navy, and the remainder are privately owned. Of this total, 11 airports are certified to handle scheduled air carrier service, including Phoenix Sky Harbor International Airport. These airports are shown in Figure 3.4. This number of airports is similar to other states of similar size, such as Colorado. Another 236 facilities across Arizona are private-use, and accommodate airplanes, gliders, helicopters, and other forms of aviation.

Sky Harbor has three runways, two of which are over 10,000 feet long. Tucson International Airport has three runways, with one being over 10,000 feet long. Yuma International Airport has the longest runway of any public-use aviation facility in the state with a length of 13,300 feet.

Approximately 20.6 million passenger enplanements were reported across 39 of Arizona's public-use airports in 2000, with the majority of that traffic occurring at Phoenix Sky Harbor and Tucson International Airports. Sky Harbor was the fifth busiest airport in the nation in 2001 in terms of operations, with 553,310 total aircraft movements; Tucson was ranked 45<sup>th</sup>. As shown in Table 3.9, Grand Canyon National Park Airport and Yuma International Airport were the third and fourth busiest airports in the state in terms of passenger enplanements.

**Figure 3.4 Arizona Public Airports**



**Table 3.9 Airport Enplanements in Arizona**

<b>Airport</b>	<b>City</b>	<b>Enplanements</b>	<b>Cargo Gross Landed Weight (lbs)</b>
Phoenix Sky Harbor Intl	Phoenix	18,094,251	1,840,755,550
Tucson Intl	Tucson	1,804,086	284,842,400
Grand Canyon National Park	Grand Canyon	524,995	-
Yuma MCAS/Yuma Intl	Yuma	63,987	-
Laughlin/Bullhead Intl	Bullhead City	45,444	-
Flagstaff Pulliam	Flagstaff	31,603	-
Grand Canyon West	Peach Springs	18,898	-
Page Muni	Page	18,768	-
Lake Havasu City	Lake Havasu City	8,569	-
RRA Sierra Vista Muni-Libby AAF	Fort Huachuca SIE	7,559	-
Ernest A. Love Field	Prescott	6,337	-
Show Low Muni	Show Low	4,059	-
Kingman	Kingman	3,420	-
Other	-	10,771	-
<b>Total</b>		<b>20,642,747</b>	<b>2,125,597,950</b>

Source: Federal Aviation Administration.

Passenger enplanements in Arizona increased overall from 1999 to 2000. While many major airports realized only modest increases in that period (Denver International Airport increased by only 1.9 percent, for example), Sky Harbor's enplanements increased by 7.8 percent.

Arizona has two airports that are qualified to handle cargo planes in addition to passenger planes: Sky Harbor and Tucson International. Table 3.9 shows that Sky Harbor had 1.8 billion pounds of gross landed weight in 2000, while 285 million pounds of cargo landed at Tucson International.

Sky Harbor operates efficiently relative to other major airports of its size across the nation. In 2000, 71 percent of the flights departed their gates within 15 minutes of their scheduled departure time. On average, it took 29 minutes from the scheduled departure time to takeoff. Approximately 75 percent of arriving flights landed on time, with a mere 5.7-minute taxi time on average.

Table 3.10 presents the sources of information used to prepare the aviation modal profile prepared in this report. The primary sources used to develop this modal profile and

system inventory included the Bureau of Transportation Statistics and Federal Aviation Administration.

**Table 3.10 Aviation Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Airport locations and characteristics	BTS	GIS
Runway locations and characteristics	BTS	GIS
Airport operations	FAA, BTS	Database
Airport performance	BTS	Database

Source: Cambridge Systematics, Inc.

### **3.1.5 Bicycle and Pedestrian**

#### ***Bicycle***

Over 2,000 miles of the Arizona state highway network – including Interstates, U.S. routes, and state routes – are considered suitable for bicycle traffic. Figure 3.5 depicts the bicycle suitability of the state highway network. About 60 percent of this statewide bicycle network is considered “more suitable” by ADOT classification standards. Developed in 1995, this bicycle suitability map and its corresponding classification system will be revised when the Statewide Bicycle and Pedestrian Plan is completed in 2003.

Individual metropolitan areas, such as Tucson, Phoenix, and Flagstaff, have their own bicycle networks as well. The Tucson metropolitan area has about 440 miles of on-street bikeways and 50 miles of urban and suburban paths. Almost 60 percent of the on-street bikeways are delineated by painted white lines, while 16 percent are signed bike routes, and 23 percent are simply paved shoulders suitable for bicycles. A few miles of the network are shared with bus lanes. An additional 90 miles of network are programmed to be built in the near term, and another 360 miles are planned by 2025.

There are about 22 miles of off-street bicycle paths in Flagstaff – known as the Flagstaff Urban Trail System – and another 30 miles are planned. These trails connect with surrounding recreational areas and trails. In addition, the city of Flagstaff has 21 miles of marked bicycle lanes on its street system. The Phoenix metropolitan area also has an extensive bicycle system, consisting of unpaved multi-use trails; paved multi-use paths; bike lanes on streets; and designated routes on streets.





## ***Pedestrian***

Heavy pedestrian traffic exists at the ports of entry between Arizona and the state of Sonora, Mexico. A total of 8.4 million people crossed the border on foot in 1999, with the heaviest volumes at Nogales (4.8 million) and San Luis (2.7 million). See Table 3.11 for all pedestrian port of entry volumes.

**Table 3.11 Arizona-Sonora Pedestrian Border Crossings**

<b>Port of Entry</b>	<b>Pedestrians Entering AZ</b>
Douglas, AZ	704,973
Lukeville, AZ	78,611
Naco, AZ	64,698
Nogales, AZ	4,806,076
Sasabe, AZ	3,588
San Luis, AZ	2,721,603
<b>Total</b>	<b>8,379,549</b>

Source: Bureau of Transportation Statistics.

MAG has developed a pedestrian plan for the Phoenix region. Most major thoroughfares in metropolitan Phoenix currently have sidewalks. Future roadway designs will include certain pedestrian-friendly design features based on the level of expected pedestrian activity in that area, the desired pedestrian level-of-service, and roadway operational and design characteristics.

The Tucson metropolitan area has multiple shared-use paths, as well as sidewalks along most streets in Tucson and South Tucson. Existing Tucson standards require four-foot wide sidewalks in residential developments and up to eight-foot wide sidewalks for commercial and industrial developments. Subdivisions within the Tucson metropolitan area are required to build sidewalks.

Table 3.12 presents the sources of information used to prepare the bicycle and pedestrian modal profile prepared in this report. The primary sources used to develop this modal profile and system inventory included ADOT; the Bureau of Transportation Statistics; and various local and regional agencies, such as PAG. As project schedules permit, information from the ongoing Statewide Bicycle and Pedestrian Plan, to be completed by ADOT in 2003, will be incorporated into this element.

**Table 3.12 Bicycle and Pedestrian Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Statewide bicycle suitability network	ADOT	GIS
Tucson bicycle network	PAG	GIS
Phoenix, Flagstaff, and Tucson regional bicycle and pedestrian system characteristics	Local off-street system plans	Text
Pedestrian border movements	BTS	Database

Source: Cambridge Systematics, Inc.

## ■ 3.2 System Elements

The Arizona transportation system is also comprised of several system elements not specific to any mode. A brief summary of the characteristics of each element in Arizona is presented below.

### 3.2.1 Intermodal Facilities

Intermodal facilities provide transfer points between different modes. Airports, which provide transfer points between air and highway, transit, or rail modes, as well as passenger rail stations, which provide for the transfer between passenger rail and highway, transit, or bicycle and pedestrian modes, are both examples of intermodal facilities. Both airports and passenger rail facilities are discussed in the “Aviation” and “Transit” modal sections, respectively; and this section will focus on freight intermodal facilities.

There are 10 major freight highway-rail intermodal facilities in the state of Arizona. Two are along Arizona & California Railway (ARZC) tracks, three are along Southern Pacific (SP) tracks (now part of the Union Pacific railway), and five service Burlington Northern Santa Fe (BNSF) tracks. Three of these facilities are container cargo facilities, three are auto vehicle transfer points (two of which allow transfer from only rail to highway), three accommodate transfer of chemicals and chemical products, and one transfers liquid edibles. These intermodal facilities are concentrated in Phoenix, with seven of them located in the metropolitan area. The remaining facilities are in Parker and Tucson. The locations of these facilities are depicted in Figure 3.6.

**Figure 3.6 Intermodal Facilities in Arizona**

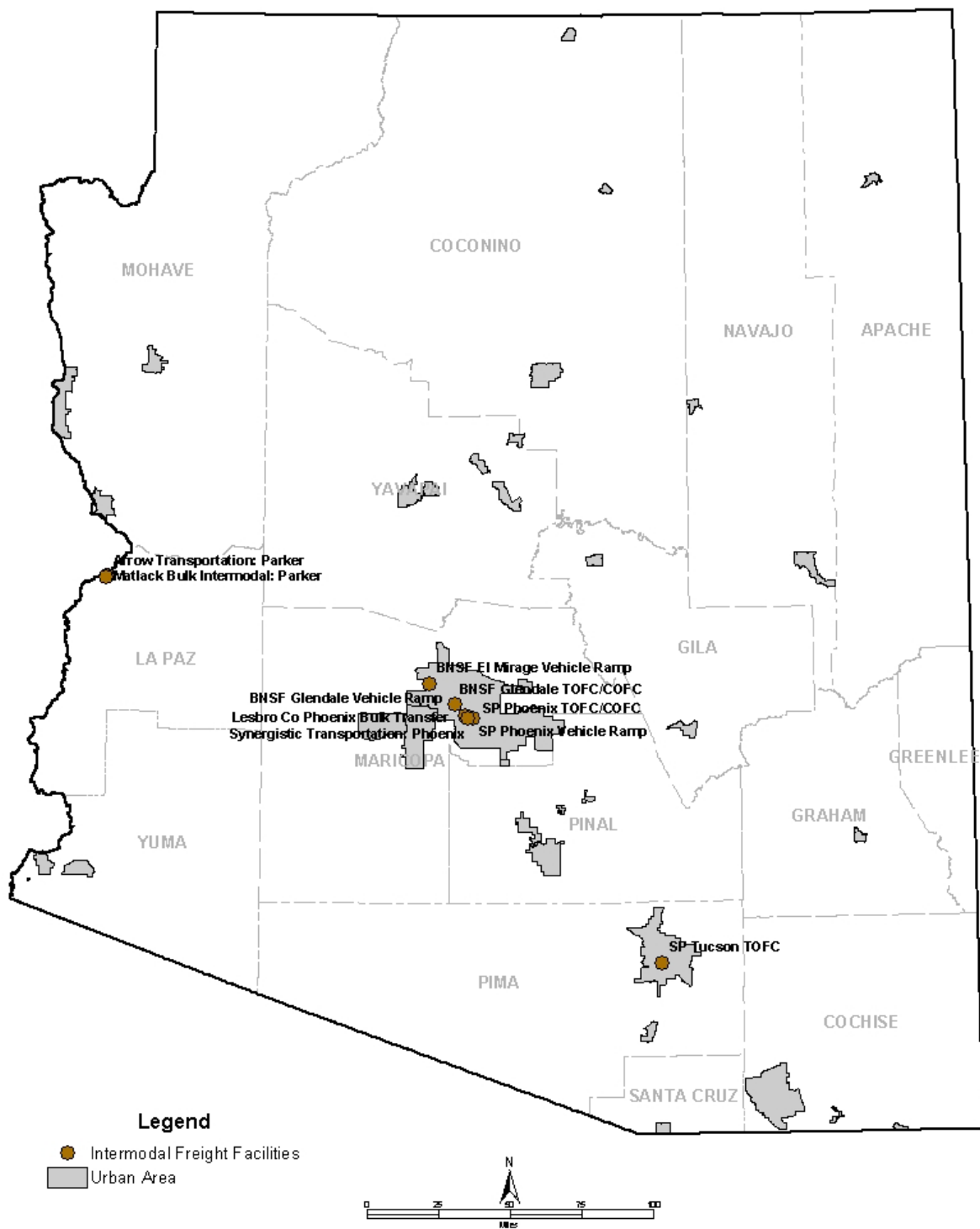


Table 3.13 shows the primary data source – Bureau of Transportation Statistics – used to prepare the intermodal facilities system inventory. As the technical analysis proceeds in Phase III of the Plan, the Reebie Transearch Data will be used to supplement the BTS data for intermodal analysis.

**Table 3.13 Intermodal Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Intermodal facility locations and characteristics	BTS	GIS

Source: Cambridge Systematics, Inc.

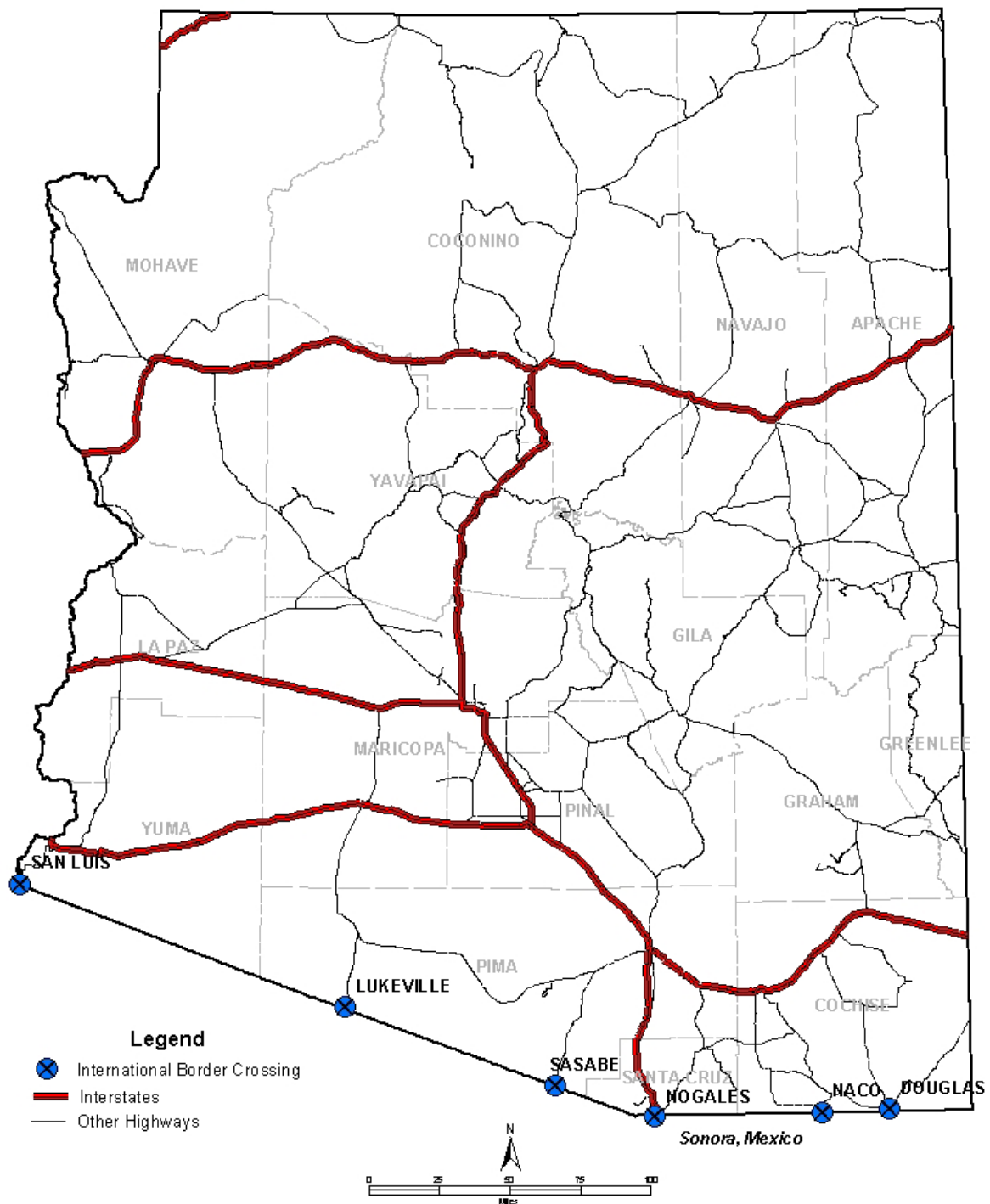
### 3.2.2 International Ports of Entry

Trade between the United States and Mexico is an integral part of both countries' economies, particularly after the introduction of NAFTA. Figure 3.7 shows the locations of six ports of entry between Arizona and the state of Sonora, Mexico: Douglas, Naco, Nogales, Sasabe, Lukeville, and San Luis. Nogales provides the greatest highway access, with Interstate Highway 19 and State Highway 82 on the Arizona side and a divided Mexican Federal Highway 15 on the Sonora side. San Luis can be accessed by U.S. Highway 95 in Arizona or Federal Highway 2 in Sonora. Douglas provides U.S. Highway 191, State Highway 80, and Mexican Federal Highway 2. The remaining border crossings provide only undivided state highway access.

In 1999, 9.9 million personal vehicles and 10,000 buses crossed the border into Arizona. The highest vehicular volumes occurred at Nogales, San Luis, and Douglas. Personal vehicles carried 25 million people into Arizona; buses carried 58,000; and 8.4 million people walked. This reflects an increase in traffic of all modes, except pedestrian, over the 1990s. Of the 34 million people entering Arizona, 46 percent crossed at Nogales, 28 percent crossed at San Luis, and 23 percent at Douglas. Specific volumes at each port of entry are listed in Table 3.14. Pedestrian movements are described in more detail in the "Bicycle and Pedestrian" modal profile.

As shown in Table 3.14, 348,000 trucks crossed the Mexican-American border into Arizona in 1999, with 74 percent of them passing through Nogales. This volume of trucks marks a 50 percent increase over the Sonora-Arizona traffic reported in 1991-1992. These trucks carried 242,000 loaded containers of freight. Table 3.15 shows the primary data source – BTS – used to prepare the ports of entry system inventory.

**Figure 3.7 Arizona International Ports of Entry**



**Table 3.14 Arizona-Sonora Vehicle, Passenger, and Freight Border Crossings**

Port of Entry	Personal Vehicles Entering AZ	Personal Vehicle Passengers	Buses Entering AZ	Bus Passengers	Trucks	Loaded Freight Containers
Douglas, AZ	2,150,092	5,912,753	NA	3,650	32,568	14,745
Lukeville, AZ	501,345	1,373,679	495	17,796	4,291	451
Naco, AZ	326,640	849,260	NA	1,400	7,766	5,886
Nogales, AZ	4,186,962	10,489,147	5,814	34,470	256,426	200,358
Sasabe, AZ	34,942	90,848	NA	NA	2,442	891
San Luis, AZ	2,687,387	6,505,771	59	739	44,829	13,744
<b>Total</b>	<b>9,887,368</b>	<b>25,221,458</b>	<b>10,018</b>	<b>58,055</b>	<b>348,322</b>	<b>242,075</b>

Note: NA = Not available.

Source: Bureau of Transportation Statistics.

**Table 3.15 Border Crossing Data in Inventory**

Data	Source	Format
Vehicle, passenger, and freight volumes	BTS	Database
Highway characteristics at crossings	AAA	Map

Source: Cambridge Systematics, Inc.

### 3.2.3 Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) continue to be an effective – and less expensive – alternative to construction of highways and transit lines for increasing capacity and efficiency of the existing transportation system. ITS solutions and strategies are used for safety and law enforcement issues as well. All forms of ITS are extensively used throughout Arizona, particularly in the Phoenix and Tucson metropolitan areas.

ADOT operates Sprint Ports for mobile inspections of commercial vehicles throughout Arizona, in addition to weigh-in-motion sites. The Department of Public Safety operates the ASPEN system, a roadside pen-based computer system that enables the Department to access CDLIS during roadside inspections of commercial vehicles. Other statewide commercial vehicle ITS programs include HELP/Prepass and the EPIC project.

ADOT operates 50 miles of freeway management system, 156 traffic signals, 42 vehicle message signs (VMS), and 60 closed-circuit television (CCTV) cameras in the Phoenix

metropolitan area, supported by its 24-hour traffic operations center. ADOT also provides the Arizona Local Emergency Response Team (ALERT) incident management service. Information collected through the ITS infrastructure is provided to the public via telephone or Internet.

AZTech™ is a public and private partnership designed to deploy and integrate ITS and provide real-time traveler information to the public in the Phoenix metropolitan area. Eight corridors are equipped with CCTV cameras, VMS, and vehicle detection stations. The Road Closure and Restriction System allows the reporting of conditions on arterial streets. An advanced vehicle location system was implemented on 94 buses and provides real-time information on bus location and route diversions. PHX also provides flight information to the AZTech™ database. Public information kiosks and a partnership with a local FM radio station relay collected real-time information to the public. The necessary integration of local, county, and state government agencies involved in traffic management and emergency response is completed through communications between the operations centers and the AZTech™ server, as well as an AZTech™ workstation located in every major operations center.

In addition to the city of Phoenix itself, many other jurisdictions in the Phoenix metropolitan area have implemented ITS infrastructure. The Maricopa County DOT – as well as the cities of Chandler, Gilbert, Glendale, Mesa, Peoria, Scottsdale, and Tempe – have synchronized signalization, signal preemption for emergency vehicles, and/or AZTech™ workstations. All, but Gilbert and Peoria, operate Traffic Management Centers. Most area buses are equipped with electronic fare payment systems and most demand responsive vehicles have computer-aided dispatch systems and navigation aids.

In the Tucson metropolitan area, the four main integrated components of the ITS infrastructure are the Transit Management System (TMS), the Arterial Traffic Management System (ATMS), the Freeway Management System (FMS), and the Regional Traveler Information Center (RTIC). The TMS includes AVL units, as well as electronic fare collection systems on SunTran buses. The ATMS consists of a traffic signal coordination program controlled from the city of Tucson's Traffic Control Center (TTCC) and is supported by video detection cameras. The FMS – also controlled from the TTCC – uses CCTV and VMS to collect and convey information. The RTIC gathers all information into one data center and disseminates it to the public. Table 3.16 shows the primary data sources used to prepare the ITS inventory, including MAG, PAG, and ADOT.

**Table 3.16 ITS Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Phoenix area and some statewide ITS systems	MAG ITS Strategic Plan	Text
Tucson area ITS systems	PAG web site	Text
Arizona ITS Plan	ADOT	Text

Source: Cambridge Systematics, Inc.

## ■ 3.3 Special Land Areas

Arizona contains a significant amount of land not owned by the state or local governments or the private sector. Approximately 70 percent of state land are controlled by the federal government or federally-recognized tribes. The following sections describe the portions of the transportation system that exist on federally-managed or tribal lands.

### 3.3.1 Federally-Managed Lands

The federal government controls 42 percent of Arizona land. The Bureau of Land Management (BLM) and the National Forest Service (NFS) are the most prevalent agencies, each overseeing approximately one-sixth of Arizona land. The military, National Park Service (NPS), the U.S. Fish and Wildlife Service, and the Bureau of Reclamation operate the remaining portions of federal lands in Arizona. Figure 3.8 shows land ownership by federal agency.

Almost 1,100 miles (or 18 percent) of the Arizona State Highway System is on land owned by the NFS, including Apache-Sitgreaves, Coconino, Coronado, Kaibab, Prescott, and Tonto National Forests. Approximately, 771 miles are in BLM lands. In addition, 108 miles of state highway lie on NPS lands, including Grand Canyon National Park, Lake Mead National Recreation Area, and Organ Pipe Cactus National Monument. Almost 90 miles of state highway cross through land owned by the military, 37 miles pass through U.S. Fish and Wildlife Service operated land, and 21 miles of state roadway exist on Bureau of Reclamation land. The Arizona state highway network is also shown in Figure 3.8. Table 3.17 shows the primary source for describing the federal lands inventory, the Arizona Land Resource Information System.

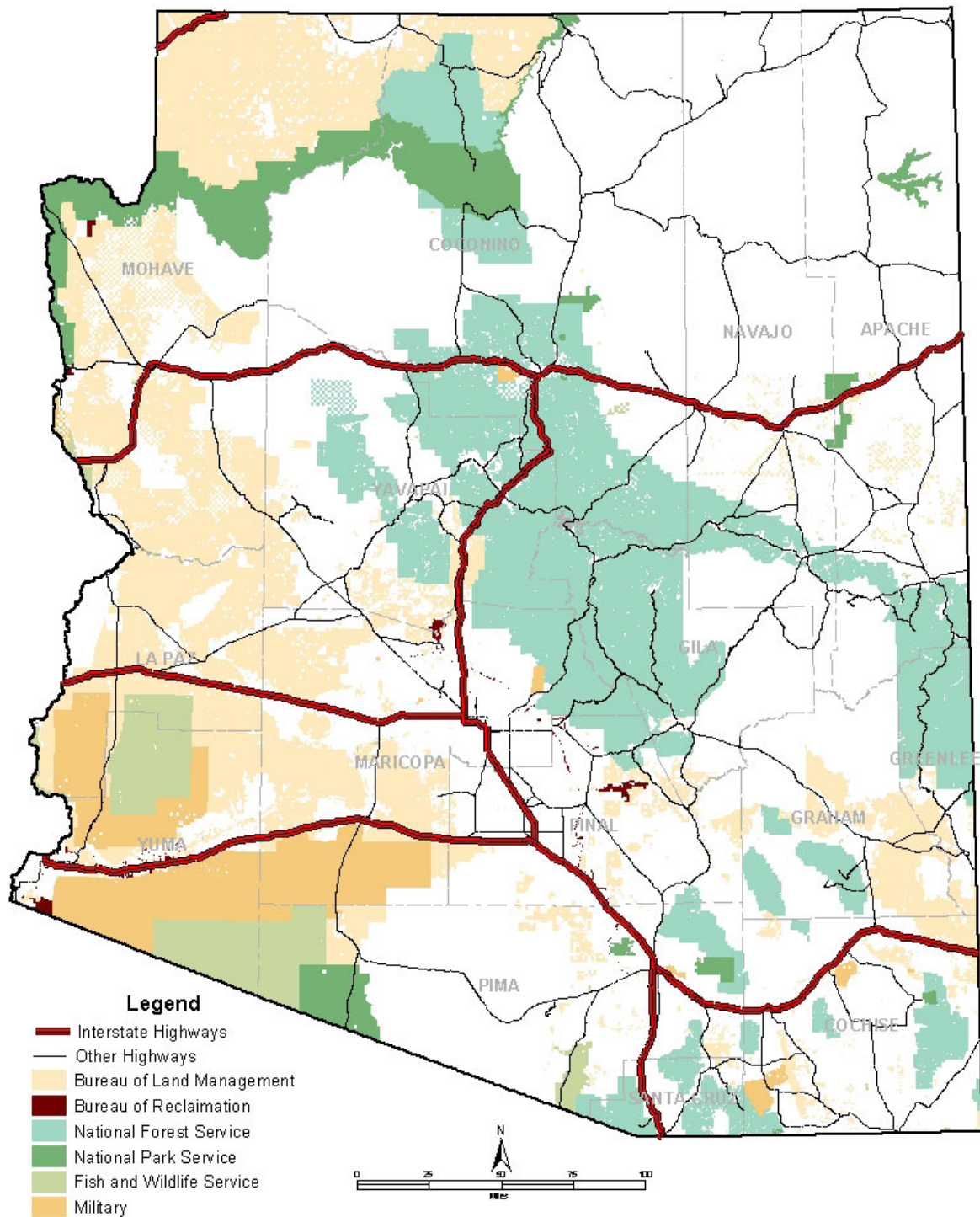
### 3.3.2 Federally-Recognized Tribal Lands

The 21 federally-recognized tribes across Arizona own more than one-quarter (28%) of Arizona land. The largest is the Navajo Nation, covering nearly 16,000 square miles in Arizona and extending into Utah, New Mexico, and Colorado. These communities are shown graphically in Figure 3.9.

The federally-recognized tribal communities contain 1,268 miles of Arizona state highway. Over one-half of these road-miles are in the Navajo Nation alone. The Arizona state highway network can also be seen in Figure 3.9.



**Figure 3.8 Federal Land Ownership in Arizona**

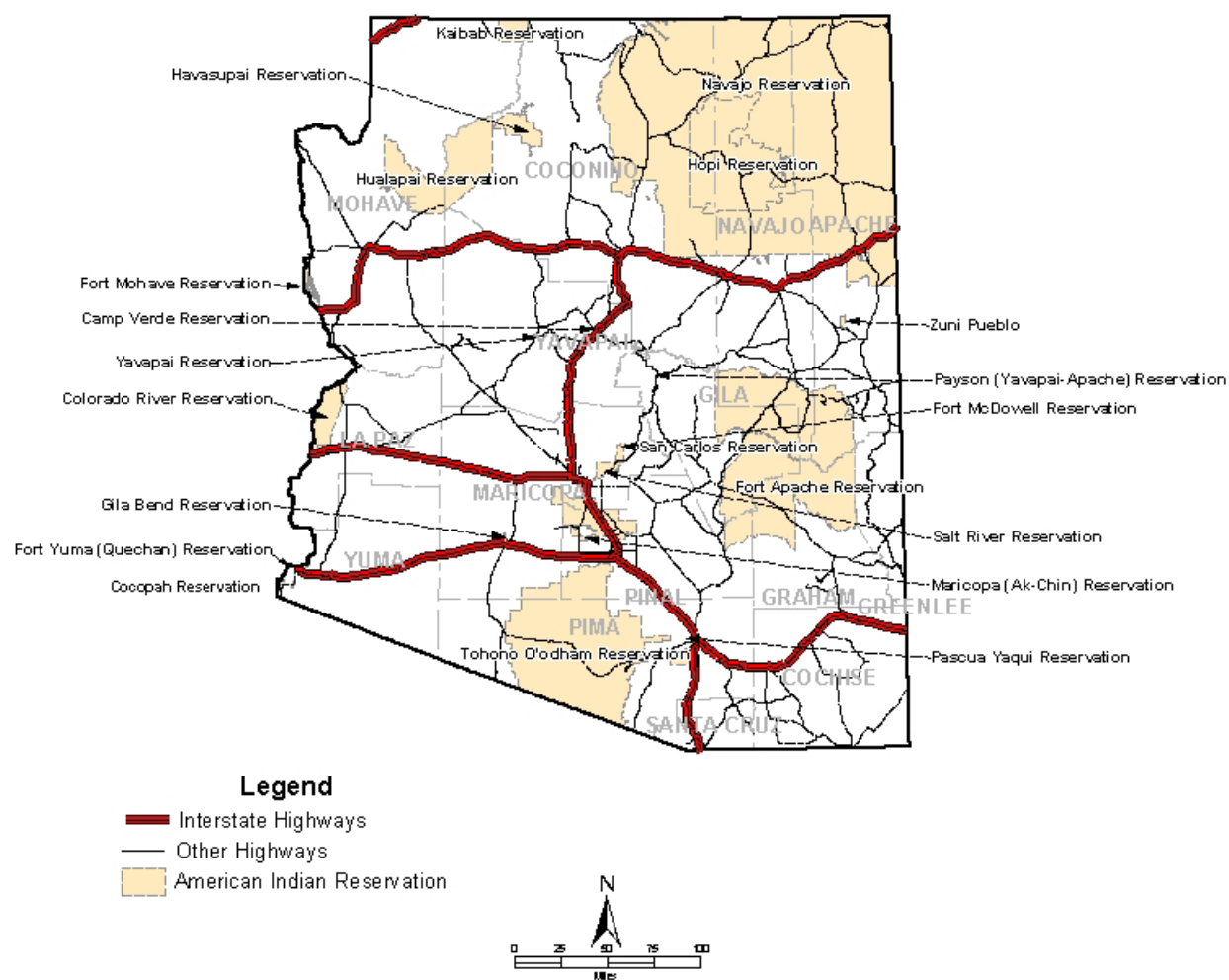


**Table 3.17 Federal Land Data in Inventory**

Data	Source	Format
Federal land ownership	ALRIS	GIS

Source: Cambridge Systematics, Inc.

**Figure 3.9 Federally-Recognized Tribal Lands in Arizona**



The Hopi and Navajo Nations both provide fixed-route service between cities on and around their reservations. The Hopi Nation operates three fixed routes between Kykotsmovi and Moencopi, Keams Canyon, and Flagstaff. The Navajo Nation operates seven fixed transit routes. Six go from Window Rock to Tuba City; Toyey; Kayenta; Fort Defiance; Crownpoint, NM; and Shiprock, NM. The seventh connects Fort Defiance with Gallup, NM. Table 3.18 shows the primary source used to develop the federally-recognized tribal lands inventory: the Arizona Land Resource Information System (ALRIS).

**Table 3.18 Federal Land Data in Inventory**

<b>Data</b>	<b>Source</b>	<b>Format</b>
Federally-recognized tribal land ownership	ALRIS	GIS

Source: Cambridge Systematics, Inc.

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# Appendix A

## *Review of Existing Transportation Visioning Efforts*

# Appendix A. Review of Existing Transportation Visioning Efforts

Appendix A presents additional detail of the plans reviewed from ADOT and other agencies, including numerous statewide planning efforts, corridor-specific plans, metropolitan plans, and Native American plans. The review reveals several important factors that can help to shape the statewide transportation vision for Arizona, including the following:

- Balanced, multimodal system;
- Funding;
- Transportation system performance;
- Transportation land use connection;
- Environmental issues;
- Economic issues; and
- Social issues.

The material presented in this Appendix provides a more detailed examination of the themes raised by these previous visioning efforts.

## ■ A.1 Balanced, Multimodal System

Many of the plans discuss in some manner the development of a balanced, multimodal system as a key organizing principle. The first goal of the 1994 *Arizona State Transportation Plan* was to develop and maintain an integrated, balanced, and multimodal state transportation system that meets the needs of Arizona.

This guiding principle can also be seen in several of the small area plans that ADOT has been preparing across the state for the past 15 years. The following examples from three small area plans use this guiding principle. The primary goal of the *Doney Park/Timberline-Fernwood Transportation Plan* was to develop an efficient, practical, multimodal system for its area. The *Casa Grande Small Area Transportation Plan Study* lists its overriding goal as the development of a sufficient, fundable, implementable, and politically acceptable multimodal circulation system. The *Lake Havasu City Small Area Transportation Study* also

mentions the need for balance in the development of the transportation system, though their orientation is more towards a balance of different types of users than different modes.

All three of the plans developed by councils of governments attempt to provide a vision for a multimodal system. The purpose of the *Maricopa Association of Governments: Regional Off-Street System Plan* was to develop non-motorized alternatives and integrate them into the county's transportation system. The *Yuma County 1995-2025 County-wide Transportation Plan* frames their goals in terms of providing the continual development of a complete, dependable, efficient transportation system. A more recent effort in the Yuma metropolitan area (the *YMPO 2000-2025 Regional Transportation Plan*) aims to assist in providing a balanced transportation system for the rapidly growing Yuma area.

Three of the plans from other levels of government highlight the need for transportation investment to follow a balanced, multimodal path. The *Flagstaff Land Use and Transportation Plan* hopes to achieve a balanced reliance on multiple transportation modes. Public input into the *Vision 21* process listed a fully-integrated transportation system, including all aspects of multimodal planning as a key goal. One of the key findings of the *Vision 21* Task Force was that Arizona needs an integrated long-range transportation plan that includes all modes of transportation. The ADOT also undertook the *Arizona Rail Passenger Feasibility Continuation Study* to analyze commuter rail initiatives in Phoenix and a rail corridor from Phoenix to Tucson.

Planning efforts produced by American-Indian reservations were the only ones that did not use the language of intermodal, balanced transportation systems. Many of the plans make specific note of maintaining and developing the local highway and arterial system. The *Navajo Nation Long-Range Comprehensive Transportation Plan*, the *Transportation Planning Study for the Kaibab Indian Reservation*, and the *San Carlos Tribe Transportation Planning Study Update* all make specific mention of highway construction priorities, but none discuss an overall multimodal strategy.

For many rural Arizonans, the highway is now and will remain the primary or even only mode of travel. With the vast majority of state residents concentrated in just a handful of cities, building a balanced, multimodal transportation plan will apply better to these few urban areas than the large rural areas of the state. While building a multimodal system plan clearly affects the majority of the population, statewide transportation planning efforts will necessarily face different challenges in different regions of the state.

## ■ A.2 Funding

Only a handful of the plans reviewed make mention of the need for adequate funding. Though fiscal constraint is a necessary part of any planning effort, not every plan links fiscal constraints to the development of a strategic vision for transportation. The 1994 *Arizona State Transportation Plan* lists as one of six goals and policies the development of an implementation system on a stable and equitable funding basis.

A couple of the small area plans also mention the need for stable funding. One of several goals of the *Kingman Area Transportation Study* is to secure adequate funding levels for the needs of the area. The *Lake Havasu City Small Area Transportation Study* discusses funding issues in terms of minimizing costs to provide a transportation system more efficiently.

None of the councils of governments plans mention funding issues in their vision processes, and only one of the American-Indian reservation plans mentions these issues. The *North Central Area Traffic Study* for the Gila Indian reservation also mentions the need for a plan to be based on adequate funding levels.

Of the plans developed by other levels of government, only the Governor's *Vision 21* report also makes note of providing stable funding and raises an additional set of funding issues – control over funding resources. One goal of the process was to increase the flexibility of funding and provide greater local control over funding and land use decisions.

Funding constraint is clearly a major issue facing transportation planning, but its inclusion as an element of an overall transportation vision may not be appropriate. A statement of the future strategic directions might better be oriented towards the goals the state would like to achieve, while specific planning and implementation efforts deal with funding constraints.

## ■ A.3 Transportation System Performance

Most previous efforts discuss the importance of maintaining or improving the performance of transportation facilities, in particular improving accessibility, mobility, and safety. Visioning efforts at each of the five levels of government analyzed here make note of these issues. From ADOT, the 1994 *Arizona State Transportation Plan* discusses elements of mobility, access, and safety throughout the plan. The corridor-specific plans conducted across Arizona are directed at improving access and mobility in their particular corridors.

Three of the small area plans make mention of these issues. The *Kingman Area Transportation Study* mentions maintaining and enhancing mobility on roadways, transit facilities, and other transportation modes. The *Lake Havasu City Small Area Transportation Study* puts even greater emphasis on mobility as a key feature of a transportation strategy. It identifies separate mobility needs for residential and economic (commercial and tourist) users, the need for access for those who cannot or will not drive, and the provision of facilities for pedestrians and cyclists. The Lake Havasu plan also identifies safety as a key element, seeking to minimize property damage, injuries, and fatalities. The *Payson Area Transportation Study* also has a major goal to maintain and enhancing existing levels of mobility on roadways and other transportation modes.

Each of the plans developed by councils of governments plans deals with transportation elements. The Yuma County 1995-2015 *Countywide Transportation Plan* makes specific note of dealing with safety concerns from hazardous materials passing through the area. The Maricopa Association of Governments: *Regional Off-Street System Plan* addresses the

importance of safety and access for non-motorized uses in regards to a system of paths and trails that are off-street and provide driving alternatives.

A couple of the plans produced by American-Indian reservations make specific note of the importance of mobility, access, and safety. The *Navajo Nation Long-Range Comprehensive Transportation Plan* puts its first priority on improving and completing the arterial network inside this very substantial reservation that covers a 26,000 square miles of the state. These goals are aimed towards increasing mobility inside the reservation and improving the efficiency of the roadway network. With fewer than one-quarter of the roads in the reservation paved, the vision of this plan is especially oriented towards enhancement of the transportation system. The *North Central Area Traffic Study*, produced for the Gila River Indian community, also makes mention of the importance of maintaining and enhancing mobility on roadways, and also mentions transit mobility and access. Each of the American-Indian reservation plans puts emphasis on improving road facilities in their areas, though often in the context of completing the road system and not specifically addressing mobility issues.

Finally, two studies from the Flagstaff area – the *Flagstaff Land Use and Transportation Plan* and the *Flagstaff Urban Mobility Study* – pay close attention to mobility and access. The latter plan was directly oriented towards improving traffic mobility for two corridors in the Flagstaff area.

Mobility, access, and safety are clearly important issues to an Arizona state transportation plan; and, as a rapidly growing state, Arizona will face constant challenges in providing the desired level of performance in these areas.

## ■ A.4 Transportation Land Use Connection

Strengthening the connection between land use planning and transportation investment was perhaps the most regularly discussed element of the previous planning and visioning efforts we reviewed. Multiple reports from every level of government discussed the importance of land use in the context of transportation planning.

The 1994 *Arizona State Transportation Plan* features a discussion of the connection between land use planning and transportation investments. One of the primary goals identified in that planning effort was to develop a transportation system that is compatible with existing and planned land uses.

Three of the eight small area planning efforts made mention of the need to better integrate transportation investment with land use planning. The *Fredonia Area Transportation Study* seeks to integrate the transportation system into the existing small town atmosphere, while providing access to prominent tourist resources. The *Kingman Area Transportation Study* lists as one of its goals to coordinate subregional land use and transportation planning and decision-making, to ensure that transportation and land use plans and policies are mutually supportive. The *Lake Havasu City Small Area Transportation Study* had a



somewhat more focused land use directive than the others. Lake Havasu City is a major destination for water recreation. Among the transportation plan elements was a requirement to ensure that transportation investments fit appropriately with the needs of water-oriented recreation. In this way, the plan attempts to integrate transportation with both the land use and economic needs of the city. The plan suggests that the transportation system should orient area visitors to recreational facilities and away from residential areas.

Two plans developed for the Yuma Metropolitan Planning Organization (YMPO), the *1995-2015 Countywide Transportation Plan* and the *YMPO 2000-2025 Regional Transportation Plan*, deal with land use issues. The 1995-2015 county-wide plan lists regional land use plans as one of eight major issues that the transportation vision should address and states that transportation facilities and services should support the achievement of adopted land use plans. The YMPO regional plan was developed in accordance with a joint city-county land use plan for the Yuma area. The land use plan considers all aspects of development, while the transportation plan zeros in more specifically on transportation issues.

Only one of the plans developed for American-Indian reservations deals with land use issues. The *North Central Area Traffic Study* sought to coordinate subregional land use and transportation planning and decision-making to ensure that transportation and land use plans and policies are mutually supportive. The other plans reviewed here did not discuss this issue directly; though one plan, the *San Carlos Tribe Transportation Planning Study Update*, did mention coordinating housing development with infrastructure availability.

Several of the other plans paid particular attention to land use issues. As its title suggests, the *Flagstaff Land Use and Transportation Plan* is a combined land use and transportation plan. This plan specifically attempts to guide growth into a compact land use pattern through both explicit land use policy and the provision of transportation and other infrastructure. The *Growing Smarter Final Report* discusses the progress of the commission set up to analyze smart growth by the Growing Smarter Act of 1998. Among the provisions of this commission was an attempt to better link city expansion to provision of infrastructure and increased involvement of citizens in the land use process.

Public involvement in the governor's *Vision 21* process highlighted numerous issues Arizonans thought important to the development of a transportation vision and plan. Among these is the interrelationship of transportation with land use and other planning processes.

Overall, the connection between transportation and land use planning appears to be one of the most significant and recurrent issues addressed by previous planning efforts. The strategic direction for transportation in Arizona should, therefore, address coordination between these very important functions.

## ■ A.5 Environmental Issues

Most of the studies that mention land use also discuss environmental issues. Two major environmental issues are connected to the transportation system in the reviewed documents: 1) the preservation of open space and 2) the maintenance and enhancement of air quality. Most plans mention at least one of these two issues and several mention both. A number also discuss the importance of preserving Arizona's environment in general terms. The 1994 *Arizona State Transportation Plan* lists as a major goal to preserve and enhance Arizona's environmental conditions and values.

The connection of transportation to both land use and environmental issues is most obvious in the preservation of open space. Open space preservation became a more visible issue in Arizona with the passage of the Growing Smarter Act of 1998. The *Growing Smarter Final Report* offers recommendations for dealing with future growth in Arizona through land preservation and planning strategies. The act also attempts to increase the amount of land set aside for open space, especially in urban areas.

Several other plans make note of the importance of land and resource preservation in developing the transportation system. The most notable of these are the American-Indian reservation plans. The *San Carlos Tribe Transportation Planning Study Update* puts a priority on preserving the natural resources of the reservation, while maintaining economic activities, particularly in agriculture and tourism. Other American-Indian reservation plans come close to this topic through a discussion of the importance of preserving cultural values. These related issues are discussed further below.

Several past visioning efforts make specific note of the connection to air quality, including the 1995-2015 *Countywide Transportation Plan* for Yuma County, *Vision 21*, and the *North Central Area Traffic Study*. The *Transportation Planning Study for the Colorado River Agency* also notes that the transportation system should discourage uses that increase noise levels.

## ■ A.6 Economic Issues

Though not as prevalent as discussions of land use, many previous planning efforts pay attention to the role transportation plays in economic development. This is especially true for the American-Indian reservation plans that are concerned about improving the economic well-being of their residents. Economic concerns span a variety of issues, including encouraging economic development, managing economic growth, and dealing with specific industries, notably tourism and recreation.

The 1994 *Arizona State Transportation Plan* has as a major goal the development of a transportation system that promotes economic development. The plan specifically notes that the transportation system needs to be responsive to permanent residents, part-time

residents, and tourists; each of whom brings a different set of economic and transportation considerations to the state.

Nearly all of the small area plans considered economic development in one way or another. These plans typically deal with smaller areas of the state that may be somewhat more concerned about the stability of their economies. These are the same areas that are most concerned with the stability of their funding levels. The *Fredonia Area Transportation Study* makes note of the town's attempt to provide economic diversity in this small town on the Utah border that is largely cut off from the state by the Grand Canyon. As one of the gateways to the Grand Canyon, maintaining a link between tourism and transportation is extremely significant. The *Kingman Area Transportation Study* and the *Payson Area Transportation Study* seek to develop transportation systems that direct and support economic development. The *Lake Havasu City Small Area Transportation Study*, as noted above, attempts to bring transportation, land use, and economic planning together by connecting specific users of the area (tourists, employees, residents) to the appropriate needs.

The group of plans that most thoroughly discuss economic development issues and their relationship to transportation are those produced by American-Indian reservations in the state. No other issues received as much attention as economic development. Several of these plans focused on attracting additional investment to their areas or enhancing their images as tourist destinations. Plans that stress economic development include the *Navajo Nation Long-Range Comprehensive Transportation Plan*, the *North Central Area Traffic Study*, and the *Transportation Planning Study for the Kaibab Indian Reservation*.

Other plans developed by American-Indian reservations put more stress on the management of economic growth. Notably, the *San Carlos Tribe Transportation Planning Study Update* makes specific mention of managing the growth of tourism to protect the reservation, while still providing for economic development opportunities. The *Transportation Planning Study for the Colorado River Agency* takes a balanced approach, attempting to connect transportation to economic development, while also considering social and other needs.

Each of these plans encourages additional economic investment, but there are different visions of what that investment would look like. This review suggests the need to consider transportation investments in light of specific economic needs of different areas in the state.

Economic development is clearly a growing issue for the state. Arizona faces various economic challenges on the horizon, including developing a base for high-tech industry and providing for a growing population of residents who are less well-off. These challenges require thoughtful investments in infrastructure and coordinated planning with economic development agencies in the state.

## ■ A.7 Social Issues

Social issues refer to the impact of transportation on community development – housing, health, and education – and on community character and cultural preservation. Of the plans reviewed, only the American-Indian reservation plans made specific mention of community development issues. These issues are nearly as important as economic development to the reservation plans. Though the connection may be somewhat less clear, nearly every one of the reservation plans deals with some social consideration. The *Navajo Nation Long-Range Comprehensive Transportation Plan* and the *Transportation Planning Study for the Kaibab Indian Reservation* mention the importance of connecting transportation to general community development. The *San Carlos Tribe Transportation Planning Study Update* is particularly interested in the connection to housing. The *Transportation Planning Study for the Colorado River Agency* sees the importance of coordinating transportation investments with education, health, and housing investments.

Several of the American-Indian reservation plans also refer to the need to preserve the cultural system of the reservation and to ensure that transportation systems do not interfere with it. The *Navajo Nation Long-Range Comprehensive Transportation Plan* seeks careful planning, engineering, and environmental assessment to minimize the effect of transportation investment on Navajo society, culture, and environment.

One of the plans from other governments and one of the small area plans mention community character issues. The *Flagstaff Land Use and Transportation Plan* notes that any transportation investment or economic development should be made to conform to the character of their community. The *Fredonia Area Transportation Study* discusses connecting transportation investment to the preservation of the small town atmosphere of Fredonia.

Although these social issues are somewhat more difficult to tie directly into the statewide vision, they clearly reflect an important group of concerns that need to be addressed through coordination of transportation planning with land use, economic development, and environmental actions. In a diverse state such as Arizona, the process of determining a strategic direction should be attentive to the varying social and cultural of its numerous demographic, ethnic, and economic communities.

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# Appendix B

*Summary of Arizona Issues Papers*

# Appendix B. Summary of Arizona Issues Papers

The context for the Arizona Long-Range Transportation Plan comes from several sources. Working Paper #1 reviewed Arizona's transportation planning documents and previous visioning efforts, long-range plans from other states, and planning efforts by other Arizona state agencies. In addition to these reviews, Arizona DOT contracted four issues papers that addressed broad trends and issues with potentially significant implications in the following general areas:

- Security considerations in the wake of the September 11 terrorist attacks;
- The interaction between transportation and land use policies;
- Changing global and national economic trends; and
- General future issues and trends.

This summary presents an overview of the key themes referenced by the issues papers. These are general themes that are relevant to transportation planning, land use planning, and related issues in Arizona. The summary is organized around five key points that cut across the four issue papers:

- Population growth and demographic change;
- Economic growth and change;
- Security concerns;
- Energy supply and efficiency; and
- Technological change and opportunities.

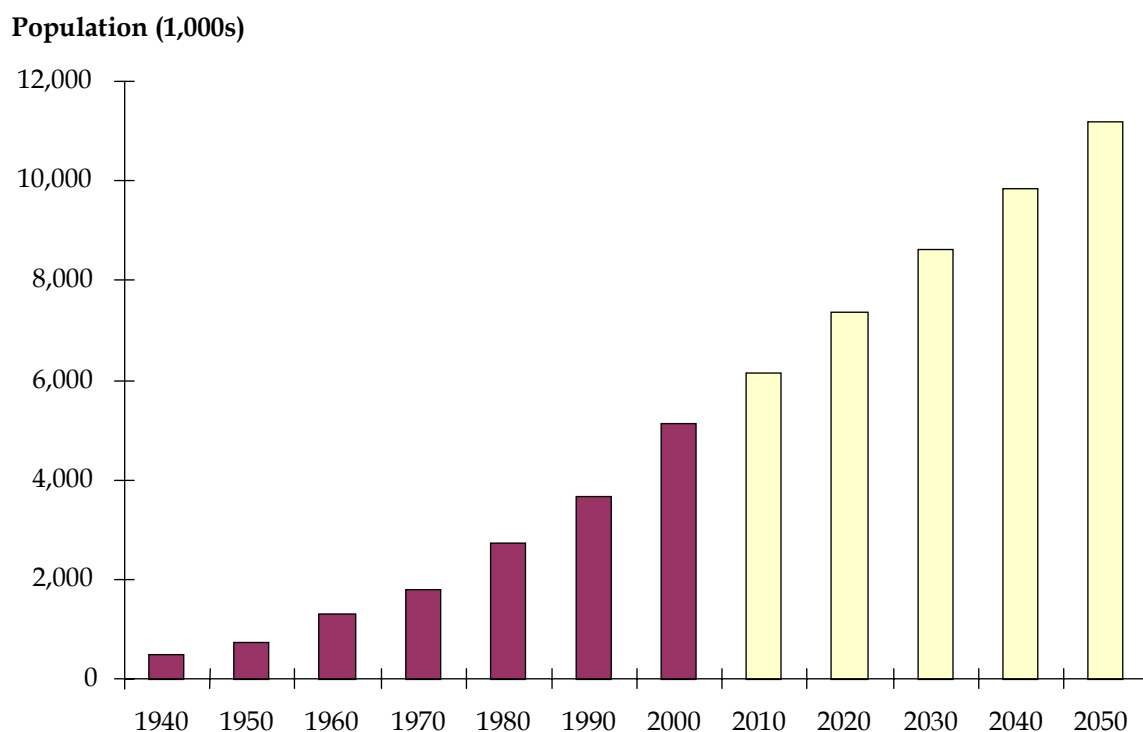
Each of the issues papers raises deals with some of these themes, often suggesting possible actions that ADOT or the state of Arizona could take to improve transportation in the state. Though some of these ideas may be inappropriate within the Arizona context, they help stretch the concept of what is possible. This exercise allows ADOT to think of the things that are "out there" without committing to a particular course of action that is unreasonable.

## ■ B.1 Population Growth and Demographic Change

The population of Arizona will double over the next 40 years, growing from five to 10 million residents. Many of these new residents will continue to locate in existing metropolitan areas, as they have for the past 40 years. The Phoenix metropolitan area has 15 times more people and the Tucson metropolitan area 10 times more people than 1940, while the non-metropolitan portion of Arizona tripled.

The importance of these changes cannot be overstated. It will require major expansions of roadway capacity and the development of transportation options and alternatives to provide acceptable levels of service on Arizona's roadways and maintain circulation. Accommodating this growth will present numerous challenges to transportation planning, as well as land use planning, economic planning, and other state planning activities.

**Figure B.1 Historic Population Growth with Future Estimates**



A rapidly growing population presents several serious concerns for the Arizona Department of Transportation:

- Population growth will hasten the sprawl of Arizona's major metropolitan areas. These areas. Transportation infrastructure costs are as much as four times more costly for sprawling metropolitan development than for more compact areas. Other infrastructure costs, such as utilities, can cost up to three times as much.
- Maintenance costs for transportation infrastructure will increase as the roadway network becomes more extensive.
- In expanding metropolitan areas, traffic congestion will likely increase faster than actual population growth. Arizonans will likely live further from where they work, increasing travel distances and times.
- Continued growth will present serious problems for access to the state highway system, especially in areas outside the major metropolitan areas that depend on highway facilities with limited access controls.

### B.1.1 Connections Between Land Use and Transportation Policy

Rapid population growth presents special challenges at the intersection of transportation and land use planning. Arizona will have to maintain existing infrastructure while providing transportation, housing, and economic opportunities for millions of new residents. Though Arizona's geography and vast rural areas present continued opportunities for metropolitan growth, state agencies like ADOT will play an important role shaping where that growth occurs.

Fostering the connection between state, regional, and local transportation and land use planning can take many forms. The issue paper on land use planning recommends that ADOT conduct a thorough assessment of efforts to coordinate with local and regional agencies, suggesting five key arenas in which ADOT can play a role in land use policy.

1. **Education and technical assistance.** ADOT can actively work with its partners at the local level to ensure that they are knowledgeable about current land use planning techniques that will better integrate new roadways and other transportation facilities into developing cities and towns. Education efforts include everything from pamphlets that describe best practices to conferences on particular land use topics to direct assistance to communities developing land use plans.
2. **Legal land use requirements.** State-level requirements for the development of general plans require cities and towns to consider transportation and other infrastructure concerns when they develop new areas. The recent series of Growing Smarter Acts in Arizona have increased the state's role in this area. Additional efforts might require land subdivision to be based on existing or planned infrastructure or require more detailed environmental studies of planned metropolitan growth.



3. **Land use capabilities within the transportation department.** ADOT could provide assistance to local governments through in house land use planning capabilities. These capabilities can range from basic data collection to economic forecasting, to developing combined transportation/land use models.
4. **Access management.** With Arizona growing rapidly, access management can provide a set of strategies that help ensure the reliable and efficient movement of people and goods on state highways. Access control can reduce congestion and accidents caused when automobiles reduce speed to make turns.
5. **Direct land use controls.** Statewide control of land use is undoubtedly an unrealistic option for Arizona, but there are degrees of land use control that can help improve transportation planning. The Arizona State Land Department, for example, controls large sections of land and is required, through the Arizona Preserve Initiative, to conduct land use planning studies for the parcels that it owns. Coordination with this department to ensure the existence transportation infrastructure for planned zoning and related changes could be very helpful.

These ideas present possibilities for ADOT to consider. Assessing the state's role in each of these areas will help ADOT determine how to best play a role shaping urban growth. Though ADOT cannot directly control land use policy, increased coordination with the agencies who do could improve the quality of transportation investments.

### B.1.2 Suggested Changes to Transportation Planning

Two of the issue papers discuss current land use planning trends that might affect how ADOT conducts transportation planning. Both the land use paper and the general futurist paper discuss current policies and planning trends that could prove useful for Arizona. These include the following:

- **Comprehensive land use and transportation planning requirements.** Florida has a program that addresses urban sprawl by requiring coordination between metropolitan planning organizations and the department of transportation. These requirements include staff members sitting on committees, comprehensive metropolitan plans to guide land use, requirements for concurrency, and regional impact analyses for large developments.
- **Improved coordination with local, state, federal, and tribal agencies.** Other agencies have greater control over the land use planning process than ADOT. Coordinating with these agencies is an important step to improving the connection between land use planning and transportation planning. It requires ADOT to consider the larger context of its actions.
- **Provide expertise and support to local and regional land use planning agencies.** Developing an image of ADOT as a service organization may help it to work with agencies that control land use planning. ADOT can provide advanced technical

assistance that many communities do not have available to them. This would enable ADOT to play a role in these communities and help it promote rational and objective planning throughout the state.

- **Transit corridor districts.** These districts focus new development in a particular area around a transit node. Combined with zoning changes that encourage mixed-use development and slightly higher densities around transit stops, these districts can help create efficient public transportation in newly developing areas of city and reduce auto dependency.
- **Access management.** Access management provides a set of tools to increase the through movement of vehicles on state highways, while decreasing the number of accidents that arise from an excess of access points.
- **Interchange area planning.** Interchange area planning can help the state ensure efficient movements in and around highway interchanges. Interchanges are typically prime sites for development. The state can set guidelines for interconnection, access spacing, shared driveways, transit service location, pedestrian movement, and internal circulation that encourage rational and effective development at highway interchanges.
- **Smart growth, transit-oriented development, and the new urbanism.** These new ideas about urban development attempt to increase the attractiveness of compact developments, encourage transit use, and improve pedestrian and bicycle circulation within towns. The application of these ideas to Arizona is an open question, requiring changes to more than just transportation planning in the state.

### B.1.3 Growth Constraints

The continued rapid population growth expected in Arizona will inevitably face substantial limits. Geographical features, a limited water supply, physical infrastructure, and congestion will all increase the costs of development and growth in Arizona.

Like many states in the West, Arizona will not be able to continue its growth without obtaining additional sources of water or using its current water sources more efficiently. Arizona's current allotment of water from the Colorado River will be fully utilized by 2030. With many areas beginning to tap out groundwater supplies, Arizona may find itself unable to continue its rapid rate of growth. A major drought caused by an El Nino weather system could accelerate these problems, forcing Arizonans to make important decisions about the way that they live.

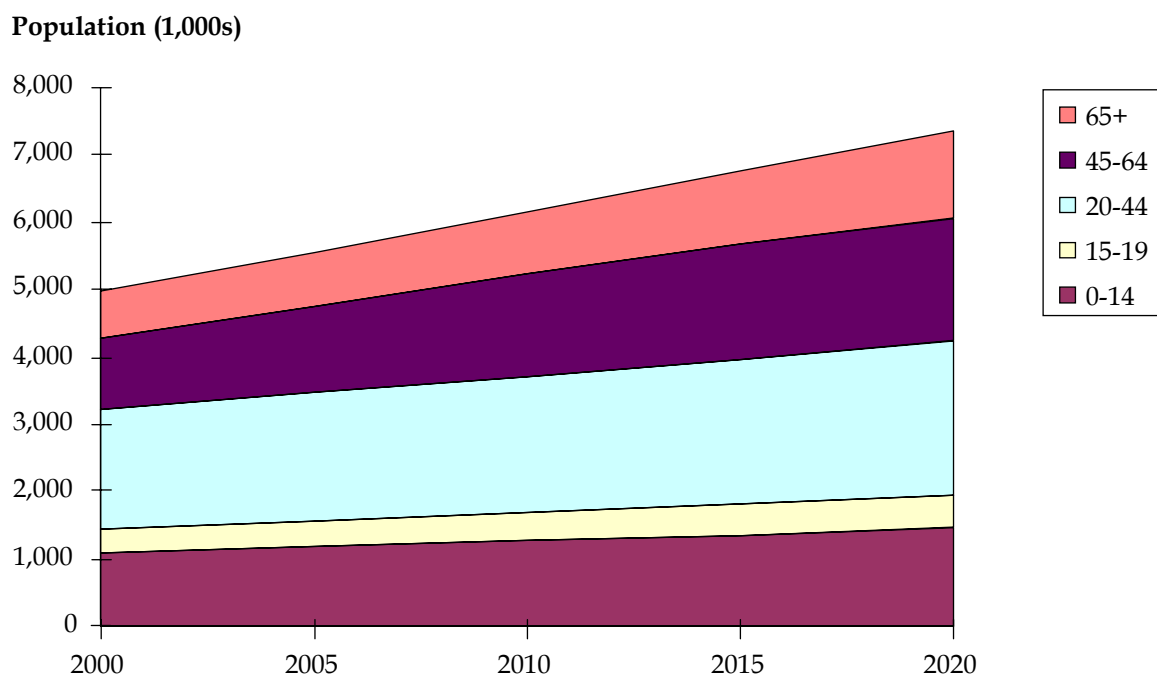
Reduced availability of key resources like water will alter the economic incentives for Arizona's residents and businesses. Water shortages may reduce the rate of population growth and discourage new businesses from locating in its metropolitan areas. Arizona may also become a less attractive retirement destination without these basic resources that

make life possible. Dealing with a declining water supply is not directly a transportation problem, but the effects of this decline will reverberate throughout the state.

### B.1.4 Demographic Change

In addition to population growth, Arizona is experiencing major population change. Already a destination for retirees, Arizona's 65 and older age cohort is the fastest growing of any in the state. At the same time, the size of the minority population has grown rapidly. Arizona is 36 percent non-white now, with the sixth largest Latino population and the third largest American-Indian population in the United States.

**Figure B.2 Projected Age Distribution of Arizona's Population**



These changes are important to transportation considerations. Older populations will be more likely impaired by health considerations that alter their transportation needs. At the same time, the baby boom generation, just beginning to retire, is much more mobile and active than previous generations of retirees. Major surveys of new retirees suggest that a larger proportion intend to keep working into retirement, either full or part time. Other activities, such as volunteering, traveling, and education, will be important to the baby boomers as well. If Arizona continues to attract a disproportionate share of retirees, it may face additional burdens on the transportation system.

In general, a changing population may also have somewhat different land use and transportation requirements. Active retirees may desire easy access to cultural and other facilities and want to live closer to these amenities. Similarly, minority groups may have different land use development and transportation needs. To the extent that minorities groups are less well off than the average Arizonan today, they will require new and expanded transit systems. Transportation investments can also help these groups improve their economic circumstances.

Arizona's growing and changing population will present serious challenges to ADOT and other state agencies now and in the future. This rapid growth also presents an opportunity for ADOT to forge new relationships with other state and local agencies to help direct this growth in a meaningful way.

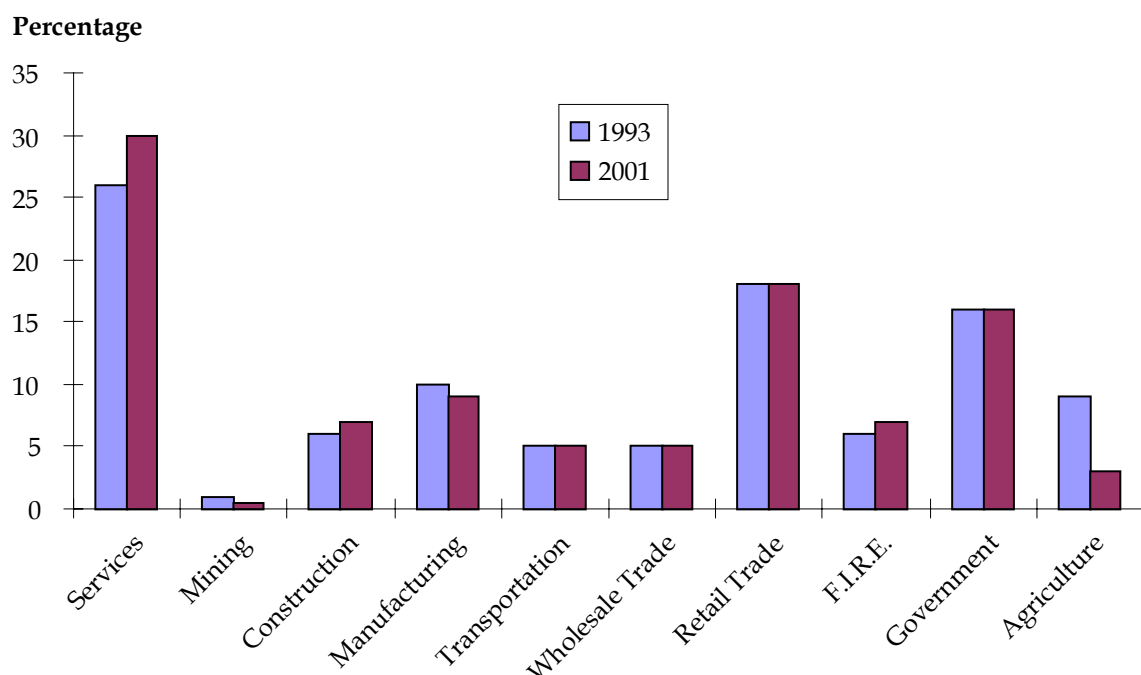
## ■ B.2 A Growing, Changing Economy

Another major consideration that arises from the issues papers concerns Arizona's economy. Famous for its agricultural and extractive industries for most of its history, Arizona now has major opportunities in high technology manufacturing, services, and international trade to consider. This changing industrial mix requires new considerations for the transportation system.

### B.2.1 Declining Extraction, Growing Services

Like many states, services have become the largest employment category in Arizona. Services refer to several types of activities, including business services that typically provide support to manufacturing and information-based industries and personal services (including health services, hotels, and related industries). The former represents the growth of an information-based economy and a movement away from high-pollution manufacturing industries. The latter, in combination with a strong retail sector, is a key player in Arizona's tourist- and retiree-based economy.

The growth of services has important implications for transportation. These firms require very different types of inputs than manufacturing, agricultural, and extractive industries. They have different land and transportation needs, able to operate in more varied locations. This could substantially alter commute patterns and freight transportation needs.

**Figure B.3 Arizona Employment by Industry**

## 2.2 Growth in Freight Traffic

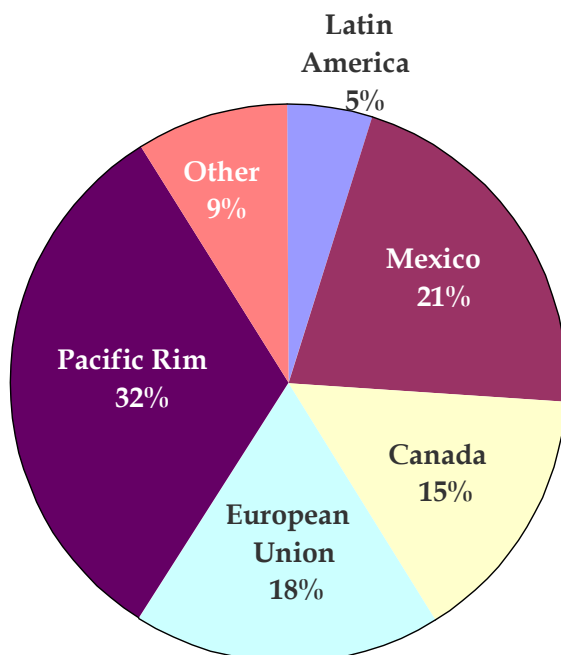
A related economic issue for Arizona is the movement of freight. Population and economic growth, combined with national and international changes in goods production and movement, make freight movement a major issue for Arizona. At the same time, freight growth is following new patterns. Growth in small parcel shipments means more additional less-than-truckload shipments and possibly different types and numbers of trucks on the road. One of the largest components of growth in freight traffic in recent years has been an increased number of small parcel delivery trucks (e.g., UPS, FedEx) moving over regional highway and arterial networks.

Arizona's most prominent corridor for freight movement is Interstate 10. In addition to the freight that travels to or from Arizona, Interstates 10 and 40 and two rail lines carry substantial freight passing through the state on its way to other areas. The ability of Arizona's transportation infrastructure to handle the bulk of this traffic requires ADOT to pay attention to major traffic generated outside of Arizona.

Remarkably, Arizona's largest trading partner (by value of goods traded) is Asia (32 percent), not Mexico and Latin America (combined 26 percent). Continued growth of Southern California ports has a direct effect on Arizona's economic position. Mexico and Latin American are becoming more important as national trading partners. Over 75 percent

of Fortune 500 companies have some production presence in Mexico. The Nogales port of entry is the major port for winter vegetables entering the United States, capturing over 60 percent of that market. NAFTA-related traffic and the CANAMEX corridor project present opportunities to capture a larger portion of increased trade with Mexico, as well as the challenges that will bring.

**Figure B.4 Arizona's Trading Partners**



Arizona's ability to capture economic growth depends in great part on its transportation infrastructure. Increases in highway and freight rail capacity, development of ITS systems to route freight, expansion of intermodal facilities, and other related investments could help sustain Arizona's current industries and provide opportunities for new industries. On the rail side, a major bottleneck near Kingman could present substantial freight capacity problems that decreases the competitive position of the state and increases congestion on Arizona's roads.

Rail freight also faces issues with at-grade rail crossings. Both the BNSF and UP rail lines have numerous at-grade crossings in Arizona that can cause traffic delays and accidents. These two main lines crossing Arizona are important pieces of the state's transportation infrastructure. Again, growth in port traffic in both Southern California and the Gulf Coast will put strains on these facilities that Arizona cannot control. Arizona will have to be attentive to these changes to ensure that its infrastructure is not overrun by trucks from other states.

Rail freight in Arizona also faces difficulties increasing capacity. Increased freight growth may require heavier use of rail lines in the state, but flat profits and limited rail competition has limited Arizona's rail infrastructure growth. Though ADOT does not directly plan and design freight rail infrastructure, it could work actively with the private sector to ensure the availability of freight rail options. The more freight that moves by rail in Arizona, the fewer trucks will impact the state's roadways.

## ■ B.3 Concerns Over Security

In the wake of the September 11 terrorist attacks in New York and Washington, D.C., security considerations have been at the forefront of the transportation industry. In formulating the MoveAZ plan, ADOT consciously undertook a thorough and careful assessment examination of security issues in Arizona.

The paper on security issues notes that there are three key issues that the state needs to examine when considering security issues: probability of attack, vulnerability to an attack, and damage that could result from an attack. At this time, it is not possible to accurately gauge the extent of any of these three issues in Arizona. To realistically address security concerns through statewide planning, ADOT will need to carefully assess the actual risk to its system. Though absolute certainty is probably impossible, ADOT should not commit funds to planning for security changes without a hard grounding in facts.

One immediate problem from the September 11 attacks has been the financial stability of America West airlines. Accounting for three-quarters of passenger boardings in Phoenix America West is one of the largest employers in the state. Financial collapse or bankruptcy would reverberate throughout the Arizona economy. Even if another airline were to provide this service, Arizona's economy would be hit hard by the loss.

The security issue paper sheds some light on the kinds of questions that ADOT needs to address to begin to understand how planning might change in coming years. These questions include:

- Have personal transportation behaviors been permanently altered by the September 2001 attacks or will they gradually return to normal?
- Can technology and procedures ultimately provide needed security without significant time penalties at airports, borders, and other facilities considered at risk?
- Will there be increased demand for rail service between metropolitan areas?

- Do increased security concerns present special challenges for intermodalism? For example, remote airport check-in counters at transit stations.
- Is security another goal like safety or mobility, or does it require more radical changes in organizational structure?

Though it is too early to make major changes to statewide transportation planning based on a single event, over time some changes will occur. In the short term, ADOT will likely play a role in the event of a terrorist attack or other catastrophic event. Transportation planners have significant knowledge about incident response, hazardous material transportation, and disaster response and recovery that will be important components of any response to a catastrophic event. Many of these strategies overlap with existing safety concerns of the department.

## ■ B.4 Energy Supply and Efficiency

Energy supply considerations present an additional infrastructure concern that directly and indirectly affects the transportation system. The U.S. transportation system is heavily reliant upon gas and oil for the mobility of the population. Changes in the availability and use of oil will have major implications for automobile reliance and costs.

Two very different energy considerations could change the shape of development in Arizona. A decline in oil production could significantly increase the costs of an automobile dependent society. At the same time, new technologies that increase energy efficiency could reinforce existing development patterns. The issue paper dealing with general issues for Arizona's future presents evidence on both of these phenomena.

The earth contains a finite amount of petroleum reserves, but the question of when they will run out is an open one. Though there is sharp disagreement about how much petroleum is left, even relatively optimistic predications are suggesting that within the next 30 years, petroleum production will peak and decline. This does not mean a sudden drying up of petroleum supplies, but it will necessarily increase costs. Given the growth of the world population, even a steady level of production will mean substantially increased oil prices. If overall production declines within 20 or 30 years, fuel costs will increase astronomically. In addition to a natural decline in petroleum extraction, other human phenomenon, such as a war in the Middle East, could bring high prices about much more rapidly.

Though the United States is heavily dependent on petroleum for transportation and economic growth, automobile manufacturers and researchers have made great strides in recent years to use this fuel more efficiently. Already, several automobile manufacturers are offering electric vehicles that use no gas and hybrid vehicles that get double or triple the miles per gallon of today's cars. Starting in 2003 in Europe, Volkswagen will be selling a car that can travel over 100 miles on a single gallon of gas, though these cars may not be suitable for the United States automobile market, dominated as it is by larger and



heavier trucks and sport utility vehicles. However, the advancement of new technologies such as carbon fiber bodies and other improvements may eventually allow for a fuel efficient sport utility vehicle. One implication of greatly improved fuel efficiency may be increased automobile travel, despite increasing fuel costs.

## ■ B.5 Creative Strategies and Technology

A growing economy and population will mean many more people and trucks on the roads. Increased security considerations could amplify congestion caused by this growth. New technology and creative strategies may provide important solutions that will help Arizona deal with these issues. Most of the issues papers raised the possibility that technology could help alleviate some of these problems.

Investments in commercial vehicle operations technologies could reduce the costs of doing business in Arizona. Automated vehicle classification and identification enables trucking firms to pay registration fees and obtain permits in advance of a vehicle's entry into the state. Weigh-in-motion sensors reduce delays and lower inspection costs for the state. Simple changes like border pre-inspection for easier commodity movements could substantially decrease wait times at border crossings, strengthen Arizona's connections to Mexico.

The Arizona Department of Agriculture already conducts preliminary inspections on agriculture in Mexico before a truck reaches a border crossing. Similar inspections for other commodities could cut border crossing times by as much as eight minutes per vehicle. The Nogales Port of Entry has also installed gamma ray imaging equipment that quickly checks for contraband and narcotics without unloading entire trucks.

At the same time, increased security concerns have increased wait times at the border. Pre-inspection may compromise the ability of the United States to adequately inspect persons and commodities passing through the border. Technologies like electronically sealed containers that monitor commodities and GPS tracking that automatically transmits truck locations to shippers can also be used to enhance security checks. These technologies are potential pieces of an advanced intelligent transportation system. A full ITS deployment in metropolitan areas (already started in Phoenix) for both people and freight can help improve the dissemination of safety and security information, as well as reducing congestion and delay.

Another technological consideration raised in the issues papers is the possibility that some people will substitute communications technology for travel. Telecommuting, online shopping, and other telecommunications advances enable individuals to conduct parts of their business and personal lives without traveling. At the same time, new technologies often stimulate increased productivity and increase economic growth. For example, online shopping may contribute to increased freight traffic by shifting some goods from a few large shipments to numerous small parcel shipments. With both population and

economy growing, there will be no realistic decline in transportation in Arizona for many years.

Finally, new technologies like the Segway could change transportation behavior in cities. The Segway is a personal transporter that uses gyroscopes and a battery to transport an individual at up to 12 miles per hour. The applications for this device remain unclear, but it is being tested by the postal service in several locations (including a hot weather feasibility test in Chandler), suggesting at least an institutional use for these devices. A rapid roll-out of the Segway would create a series of challenges for urban transportation systems in many cities.

Though these technological changes may significantly impact transportation in Arizona, they will not be as significant as the overall growth in population. New and improved technologies can help increase the efficiency of the transportation system for both people and freight, but they cannot significantly reduce the increased travel that will be produced by a substantial population increase.

## ■ B.6 Conclusion

The four issues papers raise several questions and suggest possible courses of action for both ADOT and the state as whole. They deal with large-scale issues that will affect the development of the long-range plan. These issues can be summarized into four key points:

1. No issue will have more impact on the state of Arizona than the growth of its population. Each of the papers touched on this issue and all agree that population growth will necessarily mean substantial changes to transportation planning. ADOT will need to work in conjunction with other state and local agencies to ensure that future transportation planning efforts shape Arizona's growth to protect and enhance the state's quality of life.
2. Population growth will increase personal travel and goods movement throughout the state. These changes will cause serious deterioration of Arizona's highway and rail network without additional investments. ADOT will have to determine the most appropriate role to play in maintaining and enhancing rail freight to ease the burden from trucks on state highways.
3. Several external concerns will tell ADOT what it can do. Changing levels of oil production, the growth of fuel efficient technology, declining water supplies, continued growth of the Los Angeles area ports, and other large scale phenomenon may restrict or enhance mobility on Arizona's roadways. Population growth may decline as once abundant water supplies start to dry up. Substantial increases in fuel prices may create a demand for much more fuel efficient means of transportation, substantially altering development patterns in Arizona's cities.

4. New technologies may play a role in making transportation more efficient in Arizona. Automated inspection of truck cargo and electronic permitting and toll collection can reduce wait times at state and national borders. New transportation technologies, such as the Segway, may reduce the need for some automotive transportation. Though these technologies may provide some increased efficiency they are poorly suited to deal with the massive increases in traffic and congestion that will result from population growth.

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# Appendix C

*Review of Pioneer States' Visioning Efforts*

# Appendix C. Review of Pioneer States' Visioning Efforts

Appendix C presents examples of visioning processes and vision statements from other states that are relatively further along in the process, including Washington, Pennsylvania, Florida, and Oregon. In some cases, the examples include an integrated vision statement with goals and objectives for state long-range transportation plan development.

## ■ C.1 Washington State Transportation Plan (2001)<sup>1</sup>

The Washington State Department of Transportation (WashDOT) undertook a visioning process in advance of a formal update of the Washington Transportation Plan (WTP). This process produced alternative vision statements that were based on different possible future outcomes and would lead, in turn, to alternate sets of policies, actions, and investment strategies.

The visioning process was led by WashDOT, but actively included MPOs; regional transportation planning organizations; and other key stakeholders, such as the Governor's Office, legislative leadership, and the business community. The first major visioning product was called the *Trend Scenario*, which provided a view 50 years into the future if current events were "allowed to run their course unchecked." The *Trend Scenario* was based on a detailed trend analysis developed by WashDOT, combined with expert panel discussions and committee research. The vision based on the *Trend Scenario* states, in summary:

*"The Trends Future" results when the forces of growth increase the amount of travel taking place on the transportation system in the states. Without being able to prepare for or accommodate growth in population and the economy, congestion, inadequate infrastructure, and environmental impacts are anticipated.*

WashDOT and its partners then developed an alternative vision model based on a concept that was called *Livable Future*. This alternative vision called for a change in the approach

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<sup>1</sup> Sources: Washington State Department of Transportation, *Washington's Transportation Plan – Final Vision Development Report*, March 1999; Washington State Department of Transportation; *Washington's Transportation Plan – Directions for the Future*, Newsletter, February 1999; Washington State Department of Transportation, *WTP Outcomes and Service Objectives*, September 2000.

to planning and delivering transportation to support a balance between their three key goals of “vibrant communities,” “vital economy,” and “sustainable environment.” The vision based on the *Livable Future* model, which was adopted as the preferred vision, states in summary:

*“The Preferred Future” balances the needs of the community, the environment, and the economy. As a result, “The Preferred Future” is one in which individuals live in communities they like, enjoy mobility choices, protection of their environment, and a diverse and stable economy.*

WashDOT’s vision documents provided detailed definitions of the key vision principles of “vibrant communities,” “vital economy,” and “sustainable environment.” The definitions include three elements:

1. A descriptor or vision statement of what the preferred transportation future looks like;
2. Vision outcomes, which indicate goals that are to be achieved under each vision principle; and
3. Service objectives, which provide measurable targets for assessing achieving of the vision outcomes.

Table C.1 provides examples of the vision outcomes and service objectives, and displays the relationship between the vision principle and these other elements. The vision statements for each principle are quite lengthy; as an example, the vision statement for “vital economy” states:

*It is 2050...*

- *Our economy is healthy and globally competitive;*
- *Economic activity is varied, creative, equitable, diverse, and well distributed across the state;*
- *Our economic activities are sustainable and ensure a good quality of life for our citizens;*
- *We have preserved land for economic activities and future development;*
- *We have a strong agricultural industry;*
- *We have low unemployment;*
- *Personal income is growing in all counties; and*
- *We have a well-educated, diverse employment base.*

**Table C.1 Relationship of Vision Elements for Washington Transportation Plan**

Vision Principle	Vision Outcomes	Service Objectives
Vibrant Communities	<b>Essential Mobility: System Operation and Maintenance</b> The transportation system operates effectively, efficiently, and predictably	<ol style="list-style-type: none"> <li>1. Maintain the effective and predictable operation of the transportation system to meet customers' expectations</li> <li>2. Increase the efficiency of operating the existing systems and facilities</li> <li>3. Maintain vital transportation services in the event of a natural or other disaster</li> </ol>
	<b>Essential Mobility: System Preservation</b> Transportation facilities are in sound operating condition	<ol style="list-style-type: none"> <li>1. Preserve transportation infrastructure to achieve the lowest life-cycle cost and prevent failure</li> </ol>
	<b>Essential Mobility: Special Needs Transportation</b> Transportation system provides all citizens access to basic services	<ol style="list-style-type: none"> <li>1. Meet all basic transportation needs for special needs population</li> </ol>
	<b>Enhanced Mobility: Congestion Relief</b> WTP corridors operate with minimal delay for people and freight and with continual reduction in the societal, environmental, and economic cost of congestion	<ol style="list-style-type: none"> <li>1. Reduce person and freight delay on WTP Corridors</li> <li>2. "Travel time" service objective to be developed in future updates</li> <li>3. "Reliability" service objective to be developed in future updates</li> </ol>
	<b>Enhanced Mobility: Increased Travel Options</b> Throughout the state, travelers have viable alternatives to the privately-owned automobile for their trips	<ol style="list-style-type: none"> <li>1. Improve existing travel options*</li> </ol> <p>*This is defined as new options and better quality of existing options based on market demand.</p>
	<b>Enhanced Mobility: Seamless Connections</b> The transportation system offers easy connections between different services throughout the state	<ol style="list-style-type: none"> <li>1. Create links and remove barriers between transportation facilities and services</li> </ol>

**Table C.1 Relationship of Vision Elements for Washington Transportation Plan (continued)**

Vision Principle	Vision Outcomes	Service Objectives
Vibrant Communities (continued)	<b>Improve Safety: Continuously Reduce Injury, Fatalities, and Risk</b> A safe transportation system without deaths or disabling injuries and with continuous reductions in societal cost of accidents	1. Reduce* and prevent deaths, and the frequency and severity of disabling injuries and societal costs of accidents  * Focus on the rate of frequency and severity.
	<b>Improve Safety: Increased Security</b> Customers are safe and secure, while using the transportation system	1. Improve emergency response systems 2. Increase the security of the transportation system
	<b>Livable Communities: Effective Community-Based Design</b> Integrated community design, land use, and transportation investments improve quality of life	1. Reduce impact on communities and their resources with the development and implementation of transportation projects 2. Increase integration of state and local interests in the development and implementation of transportation services and facilities 3. Balance state and local needs in the development and implementation of multimodal transportation projects
	<b>Livable Communities: Collaborative Decision-Making</b> Collaboration occurs between federal, tribal, state, regional, local, and private sector partners	1. Increase stakeholder and partner satisfaction with the level of involvement in decision-making in the development and implementation of transportation projects
Vital Economy	<b>Effective Competitive Freight Movement</b> Freight movement is reliable* and transportation investments support Washington's strategic trade advantage *See congestion relief.	1. Reduce barriers that delay the effective and reliable movement of freight 2. Maintain the ability to move freight and goods in the event of alterations to the Columbia/Snake River system as a transportation right-of-way



**Table C.1 Relationship of Vision Elements for Washington Transportation Plan (continued)**

<b>Vision Principle</b>	<b>Vision Outcomes</b>	<b>Service Objectives</b>
Vital Economy (continued)	<b>Support General Economic Prosperity</b> Transportation supports general economic prosperity	1. Support statewide economic development through targeted transportation investments 2. Support economic prosperity in distressed areas through targeted transportation investments
	<b>Support for Tourism</b> Recreational travelers have convenient and inviting access to tourist destinations	1. Increase traveler information to tourist destinations 2. Improve the quality of tourists' travel-related experiences in Washington
Sustainable Environment	<b>Maintain Air Quality</b> Transportation services and facilities help maintain air quality by meeting air quality health standards	1. Reduce the impact of transportation facilities and services on air quality in conformance with the State Implementation Plan for Air Quality
	<b>Meet Water Quality Standards</b> Transportation services and facilities help maintain water quality by meeting water quality standards	1. Reduce water quality impacts caused by transportation facilities and services to comply with federal and state water quality requirements
	<b>Maintain Habitat and Watershed Quality and Connectivity</b> Transportation services and facilities help to maintain the quality of and contribute to the recovery of the ecological functions of watersheds and habitats	1. Reduce the impacts of past projects and avoid or minimize impacts to watershed and habitat from current and future transportation activities
	<b>Reuse and Recycle Resource Materials</b> Transportation services and facilities prudently use, reuse, and recycle resource materials	1. Minimize the use of resources and increase the use of recycled materials

Essentially, these elements from the vision process provide the explicit foundation for the performance-based planning system that is being finalized for use in preparing the WTP. WashDOT is currently assessing different performance measures to supplement the three vision elements identified above and complete the performance-based planning system that will be used for assessing different WTP strategies.

## ■ C.2 Pennsylvania DOT: Strategic Performance Measurement (2000)

The Pennsylvania DOT's (PennDOT's) performance measurement system is intended to be an agency wide strategic management tool that is used to align all agency business functions and activities (e.g., capital investments, preservation, routine maintenance, operations, management functions, etc.) to achieve a core set of goals and performance targets. This focus differs somewhat from the other states that are reported here in that PennDOT's system has a much broader focus that resource allocation for statewide planning activities.

PennDOT's vision, which calls for "...[a] transportation system and services exceeding customer expectations" is further expanded upon by its agency mission statement:

*Through the active involvement of customers, employees, and partners, PennDOT provides a transportation system and services that exceed the expectations of those who use them.*

PennDOT intends to achieve this mission and vision through activities that will improve performance in eight "strategic focus areas":

1. Maintenance first;
2. Quality of life;
3. Mobility and access;
4. Customer focus;
5. Innovation and technology;
6. Safety;
7. Leadership at all levels; and
8. Relationship building.

Each of the eight "strategic focus areas" has specific goals or customer pledges, supplemented by specific performance objectives, measures, tools, and targets for each goal. Table C.2 displays the relationship of these elements for four of the strategic focus

**Table C.2 Relationship of Goals, Objectives, and Measures for PennDOT's Strategic Performance Measurement System**

Strategic Focus Area	High-Level Pledge to Customers	How Success will be Measured?	Measurement Tool	Target	
				2002	2005
<i>Maintenance First</i>	Smoother Roads	Better ride conditions on major (NHS) highways	International Roughness Index (IRI)	104 for NHS roads	99 for NHS roads
	Cost-effective highway maintenance investment	Reduction in outstanding maintenance needs	Condition Assessment for highways and bridges	Complete asset management system	Meet target established in 2002
<i>Quality of Life</i>	Balance social, economic, and environmental concerns	Timely decisions based on public and technical input on project impacts	Highway project environmental approvals meeting target dates	75% meeting target dates	90% meeting target dates
	Demonstrate sound environmental practices	Attaining world class environmental status	ISO 14001 environment criteria	Implement a pilot program	Meet ISO standards
<i>Mobility and Access</i>	Delivery of transportation products and services	Honoring commitments on scheduled transportation projects	Dollar value of 12-Year Program construction contracts initiated	\$1.3 billion per year	\$1.4 billion per year
	Efficient movement of people and goods	Reduced travel delays	2002 – Peak period work zone lane restrictions 2005 – Travel delays on selected corridors	Set baseline in 2000 for reduced 2002 lane restrictions	Meet target set in 2002 to reduce corridor travel delays
<i>Customer Focus</i>	Improve customer satisfaction	Competitiveness on Malcolm Baldrige Criteria for Excellence	Baldrige Organizational Review Package Scores – Customer Criteria	80 Department Average	100 Department Average
	Improve customer access to information	Prompt answers to telephone inquiries	Answer rate of calls to the Customer Call Center	94% of calls answered	94% of calls answered

areas. Importantly, the performance objectives (i.e., “How Success will be Measured”) are a mix of internal (agency processes and management) and external (facility conditions, etc.) strategies. PennDOT has also developed an extensive ongoing monitoring and assessment process that includes:

- Quarterly performance reports on the achievement of performance objectives;
- Annual data audits;
- Ongoing quality control for the traffic data collection program; and
- Externally-generated report cards on customer service activities and agency work products.

Many of these monitoring and assessment processes are used to assure that the quality of data and tools used in the process is sufficient to assure that results are reporting actual conditions, rather than random fluctuations due to data inconsistency.

## ■ C.3 Florida Transportation Plan (1995)

The Florida DOT’s (FDOT’s) mission statement provides a policy framework, or long-term vision, for future investments in Florida’s transportation system. Unlike the PennDOT example cited above, FDOT explicitly states that their mission statement (and related goals and objectives) is not intended to address administration of the DOT’s programs and management efficiency objectives. The mission statement states:

*The Department will provide a safe, interconnected statewide transportation system for Florida’s citizens and visitors that ensures the mobility of people and goods, while enhancing economic prosperity and sustaining the quality of our environment.*

Within the long-term element of the Florida Transportation Plan (FTP), the mission statement is directly linked to four top-level goals, which each has three to six long-range objectives. The relationship between the mission statement, goals, and objectives is indicated in Table C.3. The investment strategy in the FTP was summarized in terms of the four long-range goals. The FTP indicated the total percentage of transportation funds that would be used to support each goal, and then indicated the types of strategies that would be supported through these investments.

FDOT also created a short-range component for the FTP that provided specific short-range objectives, performance measures, 10-year targets, and existing benchmarks. The short-range component was organized around the four long-term goals, thus providing an explicit linkage back to the mission statement. Although the FTP was originally developed in 1995, FDOT has expended considerable effort since that time in refining its performance measures (and the overall FTP), particularly for its mobility program.

**Table C.3 Relationship of Long-Range Goals and Objectives to Florida DOT's Mission Statement**

<b>Element from the Mission Statement</b>	<b>Long-Range Goal</b>	<b>Long-Range Objectives</b>
<i>...provide a safe, interconnected statewide transportation system for Florida's citizens and visitors...</i>	Safe transportation for residents, visitors, and commerce	<ul style="list-style-type: none"> <li>• Reduce the rate of motor vehicle crashes, fatalities, and injuries and bicycle and pedestrian fatalities and injuries on highways</li> <li>• Improve intermodal safety where modes intersect, such as highway or railroad bridges over waterways and highway-railroad crossings</li> <li>• Improve the safety of commercial vehicles, rail facilities, public transportation vehicles and facilities, and airports</li> <li>• Improve emergency preparedness and response</li> </ul>
<i>... a safe, interconnected statewide transportation system...</i>	Protection of the public's investment in transportation	<ul style="list-style-type: none"> <li>• Preserve the State Highway System</li> <li>• Reduce the number of commercial vehicles that exceed legal weight limits on the State Highway System</li> <li>• Protect the public investment in aviation, transit, and rail facilities</li> </ul>
<i>...while enhancing economic prosperity...</i>	A statewide interconnected transportation system that enhances Florida's economic competitiveness	<ul style="list-style-type: none"> <li>• Place priority on completing the Florida Intrastate Highway System</li> <li>• Complete a Statewide High-Speed Rail System</li> <li>• Improve major airports, seaports, railroads, and truck facilities to strengthen Florida's position in the global economy</li> <li>• Improve connections between seaports, airports, railroads, and the highway system for efficient interregional movement of people and goods</li> <li>• Manage and preserve designated transportation corridors in cooperation with local governments and through advance acquisition of right-of-way</li> </ul>
<i>...that ensures the mobility of people and goods, ... and sustaining the quality of our environment.</i>	Travel choices to ensure mobility, sustain the quality of the environment, preserve community values, and reduce energy consumption.	<ul style="list-style-type: none"> <li>• Reduce dependency on SOV</li> <li>• Provide accommodation for transit vehicles, bicyclists, and pedestrians, wherever appropriate, on state highways</li> <li>• Increase public transportation ridership</li> <li>• Expand public and specialized transportation programs to meet the needs of the transportation disadvantaged</li> <li>• Minimize the impact of transportation facilities and services on the environment</li> <li>• Increase energy conservation and the use of recycled materials, native vegetation, and wildflowers</li> </ul>

## ■ C.4 Oregon Transportation Plan: Policy and Multimodal System Elements (1992)

Oregon DOT (ODOT) adopted a tiered approach to develop the Oregon Transportation Plan (OTP) in the early 1990s. Under this tiered approach, the OTP consisted of a policy element, the multimodal system element, a series of modal and multimodal plans, and a series of multimodal corridor plans. Each element was to provide increasing specificity of how the statewide transportation system was to be developed.

The policy element provided the general framework for all subsequent elements. The policy element included the following vision statement regarding long-term development of transportation in Oregon:

*The purpose of the Oregon Transportation Plan is to develop a safe, convenient, and efficient transportation system that promotes economic prosperity and livability for all Oregonians.*

The policy element included four broad goals that more fully defined the vision through the topics of system characteristics, livability, economic development, and implementation.

The multimodal system element identified corridors and facilities of a statewide transportation system. More importantly, the multimodal system element suggested minimum modal service levels; and proposed a set of major investments, policies, a financial strategy, and implementation roles to achieve those service levels and the overarching policy element. Interestingly, there was no direct correspondence between the policy vision or goals, and the evaluation measures that were used to assess the alternative multimodal strategies. While the general framework and themes were consistent between the OTP elements, the multimodal system element presented both quantitative and qualitative measures that were somewhat loosely affiliated with the vision and goals. This loose affiliation continued with subsequent elements of the OTP; while general policy themes remained consistent, unique goals, measures, and strategies were adopted for each element that were more closely aligned to the decision-making needs of those elements. While this sort of flexibility no doubt improved the “fit” between specific strategies and measures within individual modal elements, it makes it less likely that broad system goals will be a strong driver of individual program or project decisions.

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# Appendix D

*Review of Data to Support MoveAZ*

# Appendix D. Review of Data to Support MoveAZ

Appendix D presents a synthesis of the relevant transportation data sources that will be used to support the development of the Arizona Long-Range Transportation Plan (MoveAZ Plan). The results of the data synthesis will be used to build a comprehensive multimodal transportation system inventory (Task 4) to support the development and analysis of the policies and projects evaluated as part of the MoveAZ planning process.

The summary contained herein considers the review of Arizona Department of Transportation (ADOT) data sources. The review of local data from Metropolitan Planning Organizations and Councils of Government (MPOs/COGs) in Arizona is also included in this version of the working paper. The material in this appendix will be updated as additional material from the MPOs/COGs is obtained and summarized.

This appendix presents the following information:

- Data sources;
- Data review; and
- Data inventory development.

Included in this appendix are summaries for each major data source identified and reviewed in this process.

## ■ D.1 Data Sources

The data review and synthesis process was initiated to develop a comprehensive transportation system inventory for the MoveAZ Plan analysis. Several categories of data were reviewed in order to begin to develop this comprehensive database, including:

- Roadway conditions and usage data;
- Geographic coverage data;
- Roadway accident data;
- Current and future transportation projects data;



- Land use data; and
- Demographic and socioeconomic data.

The sources for these data items included the ADOT and other state of Arizona agencies, MPOs/COGs, and federal agencies. The primary sources reviewed are summarized below with the detailed descriptions of each data source provided in later sections of this working paper.

### **D.1.1 Arizona Department of Transportation (ADOT)**

A major source of data was the Arizona Transportation Information System (ATIS) maintained by ADOT. These data included geographic coverages for roads, railways, and political boundaries, as well as the Arizona State Highway System Log data, which represents the Highway Performance Monitoring System (HPMS) reported and submitted by ADOT to the Federal Highway Administration (FHWA). ADOT also maintains an automobile accident database that was reviewed and summarized in this process.

### **D.1.2 Arizona State Land Department (ASLD)**

The Arizona State Land Department data relevant to the development of the MoveAZ Plan were obtained from the Arizona Land Resource Information System. These data included geographic coverages of political boundaries, roads, and railways, as well as geological and other data. The Arizona Land Resource Information System (ALRIS) data were drawn from numerous sources, including the U.S. Census Tiger Line files, digital line graph files, and other information.

### **D.1.3 Arizona Department of Economic Security (ADES)**

The Arizona Department of Economic Security (ADES) maintains a web site containing the most recent population, occupation, and employment data for the state of Arizona. This data was developed primarily from the U.S. Census, the Bureau of Labor Statistics, or the Bureau of Economic Affairs series data. ADES also provided socioeconomic projections (occupation and employment growth) that will be used to support development of the MoveAZ Plan.

### **D.1.4 Metropolitan Planning Organizations, Councils of Governments (MPOs/COGs)**

Available data from the following MPOs/COGs have been received and reviewed:

- Central Arizona Association of Governments (CAAG);
- Northern Arizona Council of Governments;
- Pima Association of Governments (PAG)\*;
- Flagstaff Metropolitan Planning Organization (FMPO)\*;
- Yuma Metropolitan Planning Organization (YMPO)\*; and
- Western Arizona Council of Governments (WACOG).

ADOT has requested the data from the following Arizona's remaining MPOs/COGs:

- Maricopa Association of Governments (MAG)\*; and
- Southeastern Arizona Governments Organization (SEAGO).

The specific requests to each of the MPOs/COGs are presented in the last section of this working paper.

A survey of Arizona's MPOs/COGs was conducted in the summer of 2001 to determine the types of transportation data collected and maintained at the local level in Arizona that could be useful in the development of the MoveAZ Plan. The MPOs/COGs collect, maintain, and require different levels of transportation data and, in some cases, depend on data collected and maintained by ADOT to conduct transportation analyses. While some MPOs/COGs may have limited data, basic information, such as vehicle miles traveled, traffic volumes, roadway levels of service, and transit facilities and boardings were generally available and have been obtained.

Each of the MPOs/COGs maintains a list of programmed and proposed transportation projects through the Transportation Improvement Plan process. These plans were reviewed as part of Task 2, *Synthesize Transportation Vision*, and are identified in Appendix A of Working Paper #1, an annotated bibliography of all of the reviewed plans and programs.

### **D.1.5 U.S. Census Bureau**

The U.S. Census Bureau provided both geographic coverage data in the form of Tiger Line files and numerous demographic data items for several geographic levels, including

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\*Indicates a federally-designated MPO.

standard political units, as well as census tracts, block groups, and blocks. The Census also maintains Tiger Line files for Interstates, U.S. highways, state highways, highway collectors, and railways.

### **D.1.6 Bureau of Transportation Statistics**

The Bureau of Transportation Statistics provided both geographic coverage data and several data items for air, rail, and intermodal facilities and border crossings. All data were available from the BTS web site.

## **■ D.2 Data Review**

A thorough review and summary of each available data source provided by ADOT were conducted. This review process involved filling out the basic review template as shown in Figure D.1. The template was created to classify the data into the following categories:

- System usage data, including roadway traffic counts and VMT, transit ridership, pedestrian and bicycle volumes, train and freight movements, and airport boardings operations.
- System performance data, including roadway levels of service, and travel speeds and times; roadway, pedestrian, bicycle, transit, and rail grade crossing accidents; and transit and airport on-time performance.
- Facility location and condition inventory, including highway and bridge conditions and ratings; ITS components; sidewalk, bicycle, rail, intermodal, airport, and recreational facility locations; transit vehicle age and conditions; and rail line conditions.
- Environmental resources, including vehicle fleet information, culturally significant land locations, and environmentally sensitive land locations.
- Demographic and land use data, including population data and components, economic indicators, and adopted land use and zoning.
- Future projects, including programmed and planned projects, project tracking systems, and funding sources and amounts.
- Miscellaneous data, including perceptions and attitudes and any other data.

Data items were also classified by geographic coverage, including individual projects and all geographic and political groupings, modal coverage, and agency type.

**Figure D.1 MoveAZ – Data Summary Review Form****AzTP - Data Summary Review Form**

Reviewer: \_\_\_\_\_

Organization: \_\_\_\_\_

Review Date: \_\_\_\_\_

Descriptive Name of File/Data Source: \_\_\_\_\_

Agency &amp; Jurisdiction: \_\_\_\_\_

Document Title (if any): \_\_\_\_\_

Publication Date: \_\_\_\_\_

**Classification Information (check all that apply)****Data Addressed in File/Source:****SYSTEM USAGE DATA**

- ☐ Roadway traffic counts  
☐ Roadway vehicle classification  
☐ Roadway VMT  
☐ Transit ridership (systemwide)  
☐ Transit ridership (route-level)  
☐ Transit ridership profile (i.e. demographics)  
☐ Pedestrian volumes  
☐ Bicyclist volumes  
☐ Train movements  
☐ Freight movements  
☐ Airport boardings/passengers  
☐ Airport operations (commercial)  
☐ Airport operations (general aviation)  
☐ Airport operations (commercial)

**SYSTEM PERFORMANCE DATA**

- ☐ Roadway level of service  
☐ Roadway travel speeds  
☐ Roadway travel times  
☐ Roadway accidents  
☐ Pedestrian/bicycle accidents  
☐ Rail grade crossing accidents  
☐ Transit vehicle accidents  
☐ Transit on-time performance  
☐ Airport on-time performance

**ENVIRONMENTAL RESOURCES**

- ☐ Vehicle fleet information  
☐ Culturally significant land location  
☐ Environmental sensitive land location

**FACILITY LOCATION AND CONDITION INVENTORY**

- ☐ Highway conditions/ratings  
☐ Bridge conditions/ratings  
☐ ITS components  
☐ Sidewalk location/condition  
☐ On-road bicycle facility location  
☐ Off-road bicycle facility location  
☐ Transit vehicle age/condition  
☐ Rail mainline location  
☐ Rail mainline condition  
☐ Rail branchline location  
☐ Rail branchline conditions  
☐ Rail/highway crossing location  
☐ Location of intermodal facilities  
☐ Location of airports  
☐ Runway/taxiway/nav-aid condition  
☐ Location of recreational attractions

**DEMOGRAPHIC AND LAND USE DATA**

- ☐ Population  
☐ Employment  
☐ Household income  
☐ Poverty  
☐ Age  
☐ Ethnicity/race  
☐ Adopted land use  
☐ Zoning

**FUTURE PROJECTS**

- ☐ Programmed projects  
☐ Planned projects  
☐ Project tracking system  
☐ Funding sources & amounts

## Figure D.1 MoveAZ – Data Summary Review Form (continued)

### Classification Information (check all that apply) - Continued

#### *Data Addressed in File/Source (Continued):*

##### MISCELLANEOUS DATA

☐ Perceptions and Attitudes

☐ Other (Identify: \_\_\_\_\_)

#### *Other Classification Information*

##### **Geographic Coverage of Data**

☐ Individual Project

☐ City

☐ County

☐ Portion of city/county

☐ Small Area/Sub-regional

☐ Regional

☐ Statewide

☐ No geographic coverage

##### **Modal Coverage**

☐ Highways

☐ Bridges

☐ Urban Transit

☐ Rural Transit

☐ Passenger Rail

☐ Freight Rail

☐ Intercity Bus

☐ Aviation

☐ Pedestrian

☐ Bicycle

☐ Other

##### **Agency Type**

☐ City

☐ County

☐ COG/MPO

☐ Tribe

☐ ADOT

☐ Other State Agency

☐ Other

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#### **- Synopsis**

Brief overview description of the data source, including a succinct, overall assessment of data quality. Synopsis (and following sections) should each be a few sentences in length.

#### **- Data Collection Methodology**

- Describe the data collection methods (e.g. telephone surveys, road tubes, visual counts, etc.) and sampling/data update frequency. Describe use of third party data sources (e.g. Census, commercial, etc.) in deriving data.

#### **- Data Storage**

- Describe the format (hardcopy reports, maps, Access database, etc.) in which data are stored. Identify the finest level to which each data item is aggregated. Describe the time period (e.g. e.g. yearly funding, monthly aircraft operations; daily traffic volumes, etc.) reflected by each data item; indicate if the data for this time period are directly observed or derived (e.g. factoring of daily counts to find peak-hour).

#### **- Forecasting and Evaluation Processes**

- Describe the approach that is used to forecast any data item; identify specific software or other analytical methods, as well as assumptions that are used. Identify any other processes used by the agency, but not necessarily reflected in the database results.

#### **- Relevance for AzTP**

Brief discussion of the potential applicability of the data and tools for preparation of the AzTP. Particular attention should be made in discussing how the analysis could be used to prepare a system inventory, develop demand projections, address equity, identify transportation system conditions, demand and deficiencies, and evaluate program-level or system-level alternatives.

In addition to classifying the data in these ways, brief summary descriptions of the data sources were prepared, including descriptions of the data collection methods and storage formats, descriptions of any approaches used to forecast data items, and discussions of the relevance of the data item for input into the MoveAZ Plan. Summaries of these reviews are presented in this working paper.

## ■ D.3 Data Inventory Development

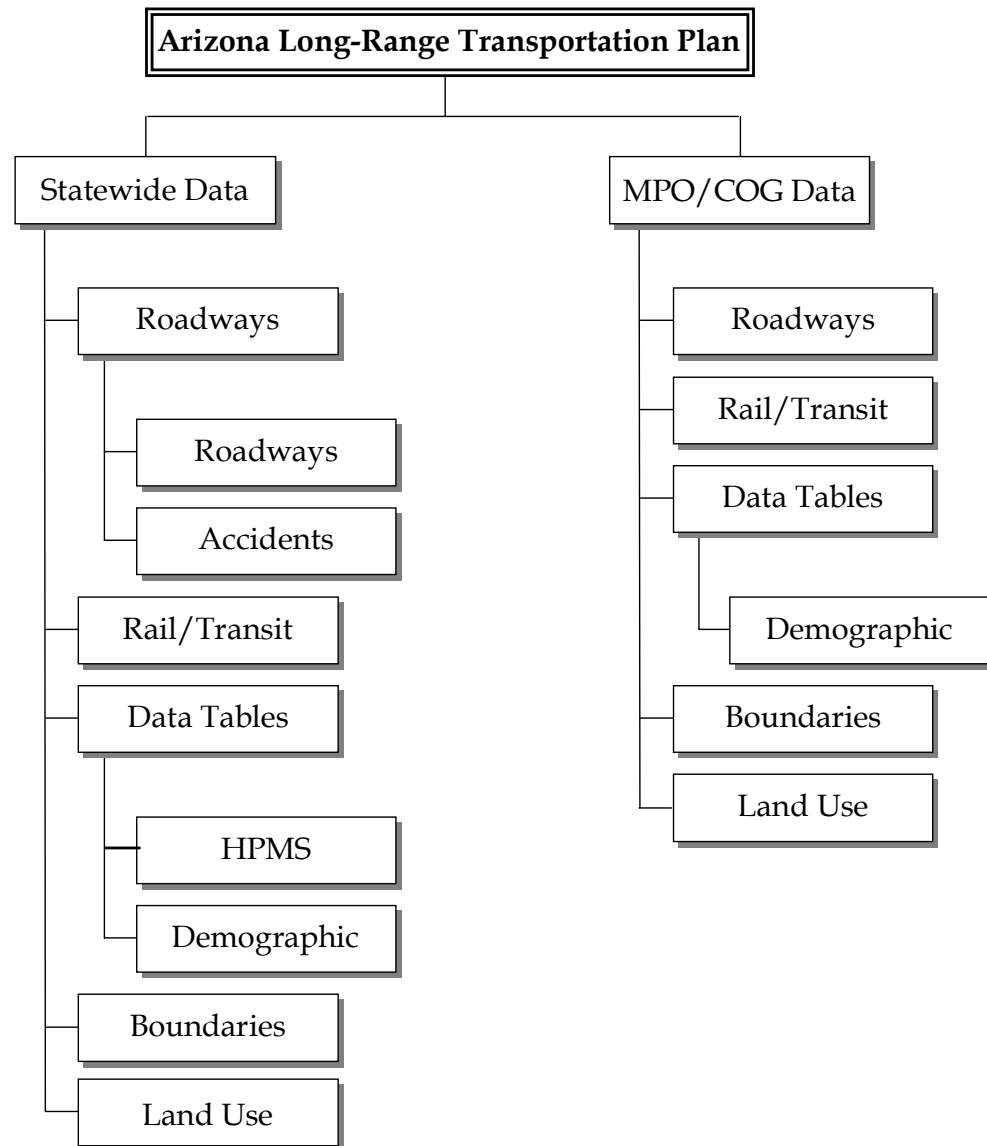
The data sources reviewed in this process were input into a directory structure for storage of all relevant data in preparation for developing the transportation system inventory in Task 4. The geographic files were input into a common structure using ArcView software, while the non-geographic files were input into a common structure using dBase software that can be linked to ArcView. ArcView is the Geographic Information System (GIS) currently used by ADOT, and it links directly with dBase software. This GIS-based system will be used as the foundation for developing the Comprehensive Transportation System Inventory in Task 4. The data inventory was structured by level and type of data as shown in Figure D.2. The geographic breakdown includes statewide, MPO/COG, city, and county levels.

The data by type was input into the specific structure identified in Figure 2. The types used included the following:

- GIS Boundary coverages showing geographic and political boundaries, including MPOs/COGs, counties, cities, urbanized areas, and American-Indian reservations;
- GIS Roadway coverages showing the locations of all major and minor roadways, including traffic accident type and location data;
- GIS Railroad and Transit coverages showing the locations of all railroads and transit systems;
- GIS Land Use files showing the land use and ownership data for major tracts of land, including federal ownership (national parks, forests, and recreation areas) and zoning data, where available; and
- Data table files, including HPMS data and demographic data from the U.S. Census and other sources.

GIS data items were converted to ArcView format using the standard ADOT formats (NAD 83 in Feet, Arizona Central). Demographic and other data came in various formats, including database and spreadsheet files, html and pdf tables, and ASCII-delimited files. These files were converted to standardized dBase files for ease of connection/linkage with ArcView.

**Figure D.2 Initial Arizona LRTP GIS-Based Directory Structure**



This data analysis effort will be used as the basis for building a comprehensive multimodal inventory and profile of roadways, transit, rail, air, non-motorized, and ITS infrastructure for the MoveAZ Plan. This data will be easily accessible in ArcView and will comprise a complete inventory.

## ■ D.4 Data Summaries

This section presents the data summaries of each data source reviewed in this process. The data requests for each of the MPOs/COGs are also presented later in this section.

### D.4.1 Summary Reviews

#### 1. *ADOT ATIS Roads – Boundary GIS Coverages*

**Source:** Boundary Shape files, ADOT, ATIS.

**Synopsis:** These files contain basic GIS coverage for urbanized areas, cities, counties, COGs, and ADOT transportation districts. The files are in ArcView shape file format and contain boundary information for each geographic aggregation. The database files contain basic identifiers for linking to tabular data. Counties and COG files also have values for the area and the perimeter of the each geographic aggregation.

#### 2. *ADOT ATIS Roads – Roadway GIS Coverages*

**Source:** Roadway Shape files, ADOT, ATIS.

**Synopsis:** These data come from three files that provide basic geographic coverages for roadways in Arizona. ATIS includes ArcView point coverages for main roads – interstates, U.S. highways, and state highways – and ArcView line coverages for all major and numerous minor routes. The coverage of streets and other minor collector routes is extensive.

Roadways are defined by route segment defined by kilometer posts. These data also include database files with lists of these segments, the kilometer ranges of segments, and locations of highway intersections.

There is also an ArcView shape file that identifies the type of highway – interstate, U.S. route, state route – for each segment. This file provides a graphic representation of the type of highway using standard highway shields.



### **3. *ADOT ATIS Environmental Files***

**Source:** Environmental Non-Attainment Areas Shape files, ADOT, ATIS.

**Synopsis:** These files have geographic coverages for areas that are in non-attainment for carbon monoxide (CO), ozone, and particulate matter (PM-10). These data also include perimeter and area values for each area, and a measure of the concentration or days out of attainment.

### **4. *ADOT ATIS Land Ownership File***

**Source:** Arizona State Landowners file, ADOT, ATIS.

**Synopsis:** These data provide geographic coverages of boundary areas of various landowners in the state. The land ownership information is given statewide. The file identifies the name of the landowner for each area and the type – American-Indian nation and U.S. Forest.

### **5. *Highway Performance Monitoring System Data***

**Source:** HPMS, ADOT, ATIS.

**Synopsis:** This file contains the HPMS event tables with both universe and sample data. These data include extensive measures of highway design, including lanes, intersections, types of pavement, medians, shoulders, and other variables. There are also several useful performance measures, including Annual Average Daily Traffic (AADT), predicted AADT (with year of future prediction), level of service (volume/service flow ratio), use of ITS elements, and a measure of truck traffic.

The performance measures are collected for sample segments of the complete highway system. Segments are drawn from a stratified sample – urban/rural, arterial type, and volume group. Sampled data are extrapolated to the highway universe using a simple expansion factor: distance in sampling stratum divided by total distance in the sample.

### **6. *Arizona Land Resource Information System Geographic Coverages***

**Source:** Boundary Shape files, Arizona State Land Department, Arizona Land Resource Information System.

**Synopsis:** These files are the Arizona Land Resource Information System geographic coverages for counties, cities, and tribal areas. The files are in ArcView shape file format and contain boundary information for each geographic aggregation. The database files contain basic identifiers for linking to tabular data.

## **7. *Arizona Land Resource Information System Roadway and Railroad Line Files***

**Source:** Roadway and Railroad Shape Files, Arizona State Land Department, Arizona Land Resource Information System.

**Synopsis:** These ArcView shape files provide line coverages of roadways and railroads. There are two roadway files: 1) one just for interstates that are derived from digital line graph data and 2) one for all major road segments, including highway collectors that are derived from 1992 Tiger Line files. The railroad data are also derived from the 1992 Tiger Line files.

## **8. *Arizona Land Resource Information System Land Ownership Data***

**Source:** Land Ownership Files, Arizona State Land Department, Arizona Land Resource Information System.

**Synopsis:** This file provides land ownership data that delineates state, national forest, and American-Indian reservation ownership.

## **9. *ADOT Accident Data***

**Source:** Accident Database, ADOT.

**Synopsis:** These data provide locations of all automobile accidents from January 1997 through December 1999. The data are identified by route and milepost or street and Cross Street. The data do not identify type of accident.

## **10. *ADES Economic Data***

**Source:** Occupation and Employment Data, ADES, <http://www.de.state.az.us>.

**Synopsis:** The Economic Analysis section at the ADES web site provides the following occupation, employment, and income data:

- Historical labor force and occupational data by month and major industry for the state, counties, and metropolitan areas.
- 1998-2008 Occupational Forecast – Employment forecast by occupation, 10-year forecast, averaged to estimate annual change. These data are collected for the state and for certain counties and metropolitan areas. Prepared in cooperation with the U.S. Bureau of Labor Statistics.
- Personal income data for counties and metropolitan areas, with separate data for earnings, per-capita income, dividends, and transfer payments.

### ***11. ADES Demographic Data***

**Source:** Demographic Data, ADES, <http://www.de.state.az.us>.

**Synopsis:** The Population Statistic section within the ADES web site provides access to Census 2000 data, including the following:

- Population with sex and age breakdowns for the state and counties.
- Population projections by county through 2050 using the state of Arizona Demographic Cohort-Survival Projections Model.
- Census 2000 data for the state, counties, cities, census tracts, and congressional districts. These data are also available from the Census bureau and are described below.

### ***12. Census Tiger Line Files***

**Source:** 2000 Census Tiger Line files, U.S. Census Bureau, The Geography Network, <http://www.geographynetwork.com/data/tiger2000/>

**Synopsis:** The Census maintains a database of geographic boundaries and physical features for use in GIS applications. Their database is maintained as a database file with longitudes and latitudes that can be converted into any GIS format. The Geography Network has converted these files into ArcView format. These files include boundaries for census blocks, block groups, tracts, cities, urban areas, and counties.

### ***13. Census Demographic Data***

**Source:** 2000 Census, U.S. Census Bureau.

**Synopsis:** These data include summary demographic attributes (population, race, age, gender, housing units, households) for the state, counties, cities and census-designated places, metropolitan areas, and congressional districts. The data are from the data items requested from every resident in the U.S. during the 2000 Census and include population with race, age, and sex breakdowns; housing unit data; households by type; and relationship to householder data.

### ***14. BTS Passenger Rail Stations***

**Source:** Bureau of Transportation Statistics.

**Synopsis:** This ArcView point file indicates AMTRAK station locations with limited associated physical station data.

### **15. *BTS Intermodal Data***

**Source:** Bureau of Transportation Statistics.

**Synopsis:** This ArcView point file indicates locations of major intermodal facilities, with associated physical characteristics and the modes that are connected.

### **16. *BTS Border Data***

**Source:** Bureau of Transportation Statistics.

**Synopsis:** These data tables include transborder surface freight data, including dollar value of the shipments, modes of transport, and origin and destinations. The BTS also supplies data for truck, train, personal vehicle, passenger, and pedestrian border-crossing volumes.

### **17. *BTS Airport Data***

**Source:** Bureau of Transportation Statistics.

**Synopsis:** The BTS Airport Data include a point file of all commercial airport locations with limited associated physical data. An ArcView line file indicates corresponding runway locations with physical runway data. The BTS provides data tables of passenger enplanements, scheduled flights, actual flights, freight tonnage, and mail tonnage at all primary airports.

### **18. *Airports Council International – North America***

**Source:** Airports Council International – North America, 1999-2001.

**Synopsis:** These data include data tables of passenger enplanements, scheduled flights, actual flights, freight tonnage, and mail tonnage at all primary airports. Percent changes between 1999 and 2000 are also included.

### **19. *Airport Location Data***

**Source:** GCR & Associates, Inc. (GCR), Airport Summary and Activity Data, September 2001, [www.gcr1.com/5010WEB/default.htm](http://www.gcr1.com/5010WEB/default.htm)

**Synopsis:** GCR web site provides access to airport data. The airport data accessible through this site is structured in accordance with the FAA Airport Master Record (FAA Form 5010-1) and is unedited information provided by GCR with data derived from the National Flight Data Center. The data of the data set matches the date of the most recent Airport Facilities Directory (AFD). The current AFD is dated September 6, 2001 according to the information provided on this site.

Users can search for airport by name, city, state, or location identifier. Airport data is divided into the following categories: general information, services and facilities, based aircraft and operations, runway information, and remarks.

The data collection methodology corresponds to the methods used by the National Flight Data Center (NFDC), which is one of the subdivisions under the Office of Air Traffic and Airspace Management. The NFDC serves as the principal element within the FAA responsible for collecting, collating, validating, storing, and disseminating aeronautical information detailing the physical description and operational status of all components of the National Airspace System.

## **20. Tucson International Airport Statistics**

**Source:** Tucson International Airport (TIA), 2001.

**Synopsis:** This document provides basic facts on TIA, including basic travel statistics (passenger boardings, departures and arrivals, freight traffic); facility data; employment and economic data; and history about the airport.

## **21. National Transit Database Data**

**Source:** National Transit Database.

**Synopsis:** The National Transit Database includes data tables on overall transit ridership numbers, vehicles and operating costs, by transit type, for major Arizona transit agencies. The database also includes a listing of paratransit providers and smaller agencies across the state.

## **22. CAAG Safety Project Analysis Database**

**Source:** Arizona Local Government Safety Project Analysis Model, 2001, ADOT.

**Synopsis:** This database is intended to address the challenges faced by local governments in determining treatment sites for safety program funding. Specifically, the model that we have access to is used to document and query incidents and accidents in the CAAG COG. Users can query crash locations, crash reports and references, specific safety-improvement project details and locations, and a cost-benefit analysis of each project.

## **23. NACOG TIP**

**Source:** NACOG FY 2002-2006 TIP, 2001, NACOG.

**Synopsis:** The transportation improvement plan for NACOG is the five-year (2002 to 2006) funding plan that is developed as part of their regional transportation planning process. These projects are the ones that are programmed for the five-year period. The file covers all programs from every mode and gives the dollar amount programmed to each

project, dollars from the highway user revenue fund, and the length of each project segment.

#### ***24. PAG 2000 and 2025 Land Use Data***

**Source:** 2025 Regional Transportation Plan, 2000, PAG.

**Synopsis:** This land use data covers traffic analysis zones in the PAG region. The data is in GIS format and includes database and shape files for both 2000 and 2025 to evaluate the long-range planning effort graphically. It includes household, population, job sector employment, and income data.

#### ***25. PAG 2001 Average Daily Traffic***

**Source:** PAG traffic volume map, 2001, PAG.

**Synopsis:** This spreadsheet has average daily traffic volumes for 210 locations in the PAG region.

#### ***26. PAG 2001 Bike Counts by Location***

**Source:** PAG database, 2001, PAG.

**Synopsis:** This data indicates bicycle volumes for 50 street locations in the PAG region. For each location, volumes for time period intervals in each direction and totals are given.

#### ***27. PAG 2000 and 2025 Bicycle Lane Data***

**Source:** PAG Tucson bicycle map, 2000, PAG.

**Synopsis:** This data shows existing, planned, and programmed bicycle routes in the PAG region. The bicycle routes are shown graphically (in GIS) and indicate what type of lane is at each location.

#### ***28. PAG 2000 and 2025 Rail Data***

**Source:** Federal Railroad Administration database, 2000, PAG.

**Synopsis:** This data shows main rail lines, spurs, and railroad crossings in the PAG region. The rail lines are shown graphically in GIS.

### ***29. Tucson 2001 Level-of-Service Table***

**Source:** PAG database, 2001, PAG.

**Synopsis:** This table has the peak hour delay and level-of-service values for the 34 highest volume intersections in the city of Tucson in 2001 and 2000.

### ***30. PAG 2000/2001 Annual Transit Ridership Data***

**Source:** Local transit agencies, IRRTP, 2000-2001.

**Synopsis:** This data gives 2000 and 2001 annual transit ridership data for all of the transit lines in the PAG region.

### ***31. PAG Aviation Data***

**Source:** PAG Regional Aviation System Plan Update, 2001, PAG.

**Synopsis:** The review covers two parts of the PAG RASP, which provides information on the PAG Aviation System. Chapter 5 contains the methodology and demand forecasts and Appendix A contains information on current approach roads to Pima County airports. Chapter 5 contains a useful chart that projects enplanements and operations out to 2030 for all Pima county airports. Appendix A has information on the speed limit; functional classification; current traffic volume; and features (shoulders, median, bicycle lanes, etc.) for major approach roads for each airport in Pima County.

### ***32. YMPO Roadway Data***

**Source:** Yuma Metropolitan Long-Range Transportation Plan, 2000, YMPO.

**Synopsis:** These data include TransCAD files with level of service, traffic speeds, and travel times from the 2000 YMPO Model, traffic counts, 2023 future Average Daily Traffic, transit ridership, and geographic coverages with land use and streets in Yuma county.

### ***33. YMPO Land Use Files***

**Source:** Yuma Metro Data Layer, 1998, YMPO.

**Synopsis:** These ArcView files give information on land use for the Yuma metropolitan area.

### ***34. YMPO Transit Ridership***

**Source:** Yuma Metro Data Layer, 2001, YMPO.

**Synopsis:** This spreadsheet gives number of passengers by transit route for the YMPO.

### **35. FMPO Roadway Data**

**Source:** FMPO.

**Synopsis:** Multiple ArcView line layers contain data on all existing local roadways, in addition to future no-build networks through 2020. Some of these layers contain roadway names, route numbers, traffic counts, and volumes. Excel tables contain extensive traffic count data from 1999 through 2001, including both raw and calibrated data.

### **36. FMPO Bicycle Route Data**

**Source:** FMPO.

**Synopsis:** These ArcView line files contain current and proposed Flagstaff bicycle routes.

### **37. FMPO Land Use Data**

**Source:** FMPO.

**Synopsis:** This ArcView polygon layer displays local land use data for the year 2000 according to 16 different land use categories.

### **38. FMPO Additional GIS Data**

**Source:** FMPO.

**Synopsis:** The FMPO GIS dataset includes extensive geospatial information for the Flagstaff region, including the following:

- U.S. Geological Survey Data;
- Monuments;
- Parks;
- Golf courses;
- Fire stations;
- Historical sites and districts;
- Schools; and
- Synchronized traffic signals.



## **D.4.2 MPO/COG Data Requests**

The following data requests have been made to each MPO/COG. Data is currently being delivered by several of the identified MPOs/COGs and will be reviewed, summarized, and input into the data inventory structure upon delivery.

### ***MAG Data Request***

The types of data requested of MAG included:

- Local transit data, including usage, performance, and route location data;
- Local data for roadways not monitored at a statewide level, including usage, performance, and geographic location data;
- Local land use data; and
- Local data on other modes, such as bicycle facility location and pedestrian facility location data.

### ***SEAGO Data Request***

The types of data requested of SEAGO included the following:

- Local transit data, including usage, performance, and route location data;
- Local data for roadways not monitored at a statewide level, including usage, performance, and geographic location data;
- Local land use data; and
- Local data on other modes, such as bicycle facility location and pedestrian facility location data.